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Does the quality of motivation matter? An examination of the relationship between goal content, self-regulation and eating behaviours

Joke Verstuyf

Promotor: Prof. Dr. M. Vansteenkiste

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“ If I am what I have and if I lose what I have who then am I ? ”

– Erich Fromm

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Joke Verstuyf, januari 2014

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Chapter 1

Does the Quality of Motivation Matter? A General Introduction

Eating regulation plays a central role in the lives of many girls and women and, to a lesser extent, also in the lives of boys and men (Serdula et al., 1999). *Eating regulation* is in the current dissertation defined as the intensity of putting effort in one's eating regulation. Eating regulation can comprise of a variety of dieting behaviours, such as *reducing* the amount of caloric intake from high saturated fat, skipping meals or engaging in a low-calory diet. As such, eating regulation can reflect dietary restraint (i.e., efforts to reduce caloric intake; van Strien, 1999) and actual dieting (i.e., actual and objectively measured reduction of caloric intake; Lowe, Whitlow, & Bellwoar, 1991). However, eating regulation might not only involve eating less, but also eating *more* food, yet, of a particular type, that is, eating more fruits and vegetables and eating more varied foods. Defined in this way, eating regulation is a fairly broad concept, as it entails both efforts to reduce food intake and efforts to engage in a healthier lifestyle.

In current society, foods that are high in saturated fat and sugar are widely available, while due to technological changes, the amount of expenditure of energy due to physical activity has dropped enormously (Haslam & James, 2005). Because of these cultural changes, researchers have labeled the current Western environment as "toxic" or "obesogenic" (Ogden, Yanovski, Carroll, & Flegal, 2007). Given such a toxic environment, regulating eating behaviours seems like an *adaptive strategy* to remain or become healthy (Haslam & James, 2005). However, research has indicated that eating regulation, and more specifically dietary restraint, has many *pitfalls*. Research towards the effectiveness of dieting behaviours points to the lack of evidence for long term benefits of dietary restraint on

weight loss and maintenance (Mann et al., 2007; Westerberg-Jacobson, Edlund, & Ghaderi, 2010; Westerberg-Jacobson, Ghaderi, & Edlund, 2012). Even more, longitudinal studies warn dieters for the ironic or rebound effects of dietary restraint, that is, over time, dieters are at increased risk for developing episodes of uncontrollable eating (i.e., binge eating symptoms) and excessive concerns over eating behaviours and weight (i.e., drive for thinness) (Liechty & Lee, 2013; Stice, 2001; Stice, Davis, Miller, & Marti, 2008). Binge eating symptoms and drive for thinness, which are considered two distinct but interrelated components of disordered eating symptoms (Garner, 1991), in turn, might cause dieters to gain, rather than lose, weight (Elfhag & Rossner, 2005; Masheb, White, & Grilo, 2013).

An important question then becomes, should individuals be refrained from eating regulation efforts? Indeed, some researchers concluded that eating regulation should be discouraged (Mann, et al., 2007; Westerberg-Jacobson, et al., 2012; Wooley & Garner, 1991). However, others emphasize the importance of further investigating eating regulation, both in terms of prevention of overweight and in terms of reducing overweight, as a means to provide effective guidelines to health care providers and dieters. Indeed, a minority of dieters succeed at maintaining a healthier weight for at least some years after their diet (e.g., Kraschnewski et al., 2010) and experimental studies even found that dieting behaviours can have protective effects on binge eating symptoms (Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998; Reeves et al., 2001). Recent studies on eating regulation try to detect *when* and *why* eating regulation relates to maintained weight loss (Elfhag & Rossner, 2005; Westerberg-Jacobson, et al., 2012). Further, researchers have called upon the necessity of developing more integrated models and theories on eating behaviours, which include both the *dysfunctional* outcomes related to eating regulation, such as disordered eating symptoms, and the potential *benefits* of eating regulation, such as healthy eating behaviours and weight maintenance and loss (Ogden, 2010; Stroebe, van Koningsbruggen, Papies,

& Aarts, 2013). Such comprehensive models could be of great relevance as a guiding framework for future research and clinical guidance.

In the current dissertation, we aimed to investigate the relationship between the type of motivation to regulate eating behaviours (i.e., "*Why"* do individuals regulate their eating behaviours and "*What"* do they strive for), from the perspective of Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000b), and a variety of eating outcomes, that is disordered eating symptoms (binge eating symptoms and drive for thinness), healthy eating behaviours, weight changes, and dietary exhaustion. An overview of the outcomes within each empirical Chapter is offered in Table 1. The general thesis is that the type of motivation underlying eating regulation might present a key factor in predicting both adaptive and dysfunctional eating outcomes. In the first part of this General Introduction, a brief outline of the prevailing literature on eating regulation and its consequences is provided. In the second part, we provide a conceptualization of what high-quality motivation means, both in terms of the goal-content and the type of regulation. Next, the central mechanism between motivation for eating regulation and eating behaviours, that is, the satisfaction and frustration of three basic psychological needs (i.e., autonomy, competence, and relatedness), is discussed. In the third and final part, an overview of the aims and research questions that are addressed in this dissertation is offered along with a brief outline of the specific chapters of the present dissertation.

Part I. Putting Eating Regulation in Context

Eating regulation is widespread in current society. For instance, about 44% of adult women indicate they are currently trying to regulate their eating behaviours to lose weight and an additional 34% regulate their eating behaviours to maintain their weight. Although eating regulation efforts steeply increase among overweight women, also approximately 29% of normal-weight women regulate their eating behaviours to lose weight (Field, Haines, Rosner, & Willett, 2010; Serdula, et al., 1999). Further, adolescents

and young women are more likely to indicate they are regulating their eating behaviours, compared to older women (Serdula, et al., 1999). Although eating regulation is more common among women, compared to men, within every weight group and socio-demographic category, also approximately 29% and 35% of men report eating regulation to lose and maintain weight respectively (Serdula, et al., 1999).

The high prevalence of eating regulation is mirrored in the abundance of research towards eating regulation and its consequences in the academic arena. In line with the higher prevalence of eating regulation in women, the majority of these studies focused on female populations. Studies on eating regulation have centered around two research domains. First, eating regulation has been examined in the context of *body image concerns* as a risk factor for eating disorders. Second, eating regulation has also been studied in the context of *obesity* prevention and treatment. Interestingly, these two strands of work have developed quite separately, with studies being published in different scientific journals and being presented on different scientific conferences (Ogden, 2010). In what follows, a summary is given of the current state of both research domains.

Eating Regulation in the Context of Body Image Concerns

Eating regulation among women cannot be understood without taking into account the sociocultural importance and meaning attached to body size and body image in Western culture. That is, in current society, (a) great importance is attached to appearance and attractiveness (e.g., Slater, Tiggemann, Hawkins, & Werchon, 2012), (b) thinness is equated with attractiveness, as well as with a wide range of positive personality characteristics (Dittmar, 2007; Evans, 2003) and (c) dietary restraint is portrayed as the pathway towards an attractive (i.e., thin) appearance (Dittmar, 2007).

The importance and meaning attached to physical appearance. Women are often evaluated in terms of their appearance and attractiveness.

Critical analyses of portraits of women in the media and arts have shown that women, compared to men, are less present in a broad range of media sources and, if they are portrayed, this most often is in terms of their looks (Thornham, 2007). Moreover, the ideal body size for women, as portrayed in the media, has become increasingly thinner after 1960 (Schick, Rima, & Calabrese, 2011), with even Barbie dolls having become thinner compared to when they were first put on the market (Dittmar, Halliwell, & Ive, 2006). The body size of models is currently on average 20% underweight (Dittmar, 2007), which is extremely thin given that the American Psychiatric Association (2000) considers 15% underweight as the cut-off criterion for Anorexia Nervosa.

One important source of exposure to the thin-ideal are advertisements. In many advertisements, attractiveness and thinness are sold as essential characteristics of a happy and successful live along with the message that buying the product will result in the ideal body and ideal life (Dittmar, 2007; Evans, 2003). For instance, in a recent study, Slater and colleagues (2012) investigated the content of 14 websites which were often used by teenage girls. They found that these websites had a high number of advertisements aimed at selling cosmetic products, dieting products, and dating services to girls. Further, the persons portrayed in the advertisements were mostly young, attractive, and thin girls. After reviewing studies on the beliefs of individuals about thinness and overweight, Ogden (2010) concluded that thinness is associated with control, success, and freedom, whereas overweight is associated with indulgence, laziness, isolation, and incompetence. Taken together, in current society, women are primarily portrayed in terms of their appearance, with thinness as an essential characteristic of attractiveness, and are exposed to numerous advertisements that reinforce the importance of beauty and thinness.

In line with the importance and meaning attached to thinness, body dissatisfaction is widespread among women in Western society (Tiggemann, 2004). Women generally would like their body to be smaller and especially

the stomach, waist, thighs, and hips are subject of dissatisfaction among women (Ogden, 2010). Further, girls and women across the lifespan report feeling dissatisfied with their body (Davison, Markey, & Birch, 2000; Pliner, Chaiken, & Flett, 1990; Tiggemann, 2004), although it peeks during adolescence (Markey, 2010). Within the research domain towards body dissatisfaction, living in a culture with high exposure to the thin-ideal is considered an important risk factor of body dissatisfaction. Indeed, exposure to the thin-ideal was found to cause increases in body dissatisfaction (Groesz, Levine, & Murnen, 2002; Hausenblas et al., 2013). Yet, not all women are equally vulnerable to develop body dissatisfaction when exposed to media images. Several moderating variables, such as self-esteem and age, have been investigated, indicating that some women are more vulnerable to adopt the body perfect ideal compared to others (e.g., Groesz, et al., 2002). One of the most empirically studied risk factors is the degree to which adolescents personally adopt the thin-ideal, with adolescents adopting the thin-ideal being particularly prone to body dissatisfaction after exposure to the body perfect ideal (Thompson & Stice, 2001). Therefore, recent research investigates which factors can explain why some persons adopt the thin-ideal. For instance, the role of identity development was examined (Vartanian, 2009), with adolescent having difficulties with forming a clear identity being more likely to adopt the body perfect ideals (i.e., thin-ideal for girls and muscular ideal for boys). In the current dissertation, the role of identity processes in adopting body perfect ideals is further explored in Chapter 7.

Although body dissatisfaction is reported among many girls and women, it is not harmless. For instance, body dissatisfaction is a strong predictor of chronic dysphoria (Rosenstrom et al., 2013) and was found to be the most robust predictor of disordered eating symptoms (Stice, 2002). Within the sociocultural model of eating disorders, it is stated that adoption of the body perfect ideals leads to body dissatisfaction (Thompson & Stice,

2001), which in turn leads to disordered eating symptoms, through increased levels of negative affect and dietary restraint (Stice, 2001).

Body dissatisfaction and dietary restraint. One consequence of body dissatisfaction is the engagement in restrictive eating regulation, presumably because dietary restraint is considered an effective strategy to control weight and body shape (Stice, Mazotti, Krebs, & Martin, 1998). Yet, dietary restraint is not without its costs as it is considered a risk factor for disordered eating and, more specifically, for binge eating symptoms (Stice, et al., 2008; Stice, Presnell, & Spangler, 2002). The roots of this hypothesis can be found in the Dietary Restraint Theory (Herman & Polivy, 1980; Polivy & Herman, 1985), in which it is stated that dietary restraint is related to both undereating and "eating more as a result of the loosening of restraints in response to emotional stress, intoxication, or preloading" (Polivy & Herman, 1989, p. 342). According to Dietary Restraint Theory, binge eating symptoms are inherently connected to dietary restraint, which would explain the weight cycling or "yo-yoing" that is often found in dieters. In line with this, Heatherton, Herman, Polivy, King and McGree (1988) stated that "the restrained eater who is exclusively restrained… is not representative of restrained eaters in general, whereas the restrained eater who occasionally splurges is" (p. 20).

Although Dietary Restraint Theory stimulated abundant research towards the impact of dietary restraint on binge eating symptoms, research findings are not as conclusive as the theory suggests (Stice, 2002). In fact, the obtained association between dietary restraint and binge eating symptoms seems to depend, in part, on the questionnaire used to assess dietary restraint (Stice, Ozer, & Kees, 1997; van Strien, 1999) and the study design (Stice, Fisher, & Lowe, 2004).

As for the questionnaires being used, research that identified restrained eaters based upon the Restraint Scale (RS; Heatherton, et al., 1988) consistently found restrained eaters to overeat after inducing triggers (e.g., eating a small amount of high caloric food, inducing negative affect).

However, the RS was criticized for confounding items which tap into binge eating symptoms with the items that tap into dietary restraint, thereby selecting dieters who fail in their eating regulation by definition (Stice, et al., 1997). Indeed, subsequent research that selected restrained eaters on the basis of other scales failed to replicate previous findings (Stice, et al., 1997; van Strien, 1999). Specifically, restrained eating was associated with binge eating symptoms, only among restrained eaters who additionally scored low on self-reported inhibition. These findings led some researchers (e.g., Van Strien, 1999) to conclude that, in addition to unsuccessful dieters, there also exists a group of successful dieters. To further examine which features characterize successful dieters, individual difference variables, such as having an emotional eating style (van Strien et al., 2013) or general self-control strength (Vohs & Heatherton, 2000) received more attention. In the current dissertation, the role of having an emotional eating style and general self-control strength on binge eating symptoms was explored in Chapter 6.

In addition to the questionnaires being used, also the research design varied between studies, which may partly explain divergent findings. Specifically, although prospective studies indicate that dieting (as self-declared by individuals) predicts subsequent increases in overeating (Stice, et al., 2008), experimental research found evidence for the opposite pattern (Burton & Stice, 2006; Stice, Presnell, Groesz, & Shaw, 2005). Experimental trials, in which participants were randomly assigned to a dieting versus waitlist condition, indicated that a dieting intervention significantly decreased binge eating symptoms in obese (Goodrick, et al., 1998; Reeves, et al., 2001), overweight (Klem, Wing, SimkinSilverman, & Kuller, 1997), and normal weight (Stice, et al., 2005) participants. These different results may be due to the different conceptualisation of restraint. While Stice and colleagues (2005; Stice, Cooper, Schoeller, Tappe, & Lowe, 2007) manipulated actual food intake, thereby equating restraint with actual reduced food intake, Van Strien and colleagues (van Strien, Engels, van Staveren, & Herman, 2006) argued that dietary restraint is mainly a

cognitive construct reflecting efforts to regulate food intake. Such efforts do not necessarily translate into actual reduced food intake precisely because at least some self-declared dieters (i.e., dieters who score low on self-reported inhibition) fail to successfully reduce their amount of food intake. In the current dissertation we aim to further investigate *when* and *why* efforts to regulate eating behaviours relate to binge eating symptoms and when these efforts relate to adaptive eating outcomes. Indeed, the extent to which eating regulation may entail self-reported (dis)inhibition likely depends on the motivation underlying eating regulation efforts (Moller, Deci, & Ryan, 2006; Muraven, Gagné, & Rosman, 2008).

Finally, we would like to note a recent shift in research on body image and eating behaviours, that is, boys and men are increasingly included in studies towards body image concerns (e.g., Barlett, Vowels, & Saucier, 2008). The focus on women in previous research was driven by the observation that body dissatisfaction and disordered eating symptoms are more central themes in women's lives (Esnaola, Rodriguez, & Goni, 2010). However, body image concerns among men are on the rise as well as studies towards antecedents and consequences of male body dissatisfaction (Esnaola, et al., 2010). Studies investigating the relationship between adoption of the body perfect ideal and eating regulation among men yielded mixed findings (Cafri et al., 2005), which is in part due to the different characteristics of the body perfect ideal for men. That is, for men, the body perfect ideal entails being muscular and lean, which may lead them to desire both weight-gain and weight loss. For instance, men who are concerned with their body image have been found to engage in fasting periods as well as in periods of eating more in order to attain both a lean and muscular body. Further, rather than using drastic dieting strategies to attain the body perfect ideal, men engage in fitness and bodybuilding exercises and use food supplements and steroids more often (Cafri, et al., 2005). Given the increasing prevalence of pursuing the muscular ideal in men and the negative physical and psychological consequences of pursuing this ideal, it was

deemed important to investigate antecedents of adopting the muscular ideal in the current dissertation as well.

Eating Regulation in the Context of Overweight and Obesity

Eating regulation has also been investigated frequently in the context of overweight and obesity. The World Health Organization (WHO) has defined overweight and obesity as abnormal or excessive fat accumulation that may impair health (e.g., Haslam & James, 2005). The Body Mass Index (BMI) is commonly used to classify overweight and obesity in adults. It is calculated by a person's weight in kilograms divided by the square of his height in meters (kg/m2). Individuals with a BMI greater than or equal to 25 are classified overweight, whereas a BMI greater than or equal to 30 is obesity. For children and youngsters under the age of 16, the adjusted BMI is used, in which the BMI is set off against representative norms for a comparable age group. Using these criteria, it is found that overweight and obesity is rapidly increasing in Western cultures. That is, numbers of obesity have doubled since 1980 (Haslam & James, 2005). In Belgium, about 47% of adults are classified as overweight, of which 14% obese. Further, 18% of Belgian children between 2 and 17 years of age are classified as overweight (WHO, 2008).

Overweight and obesity have been linked to a range of physical problems, such as diabetes, cardiovascular disease and certain types of cancers (Haslam & James, 2005). Further, overweight and obesity is also linked to psychological problems, such as depression, anxiety, low self-esteem, and poor body image (Ogden, 2010).

Given the high prevalence of overweight and obesity and the physical and psychological consequences, much effort has been invested in detecting effective treatments. The basic cause of obesity and overweight is an energy imbalance between calories consumed and calories expended and, therefore, the “obesogenic” environment is considered a major cause of the increasing prevalence of overweight and obesity (Haslam & James, 2005).

The majority of treatments for obesity focused on developing a healthier lifestyle in such an obesogenic environment by putting overweight and obese persons on low-calorie diets. Thus, dieting behaviours and their effects on weight have been under investigation for decades in the obesity research domain.

Most studies on obesity treatments draw a pessimistic conclusion. That is, both traditional treatments of obesity and multi-disciplinary treatments have found low success rates in terms of weight loss, at least in the long run. Based on reviews of a multitude of studies, it is estimated that between 90 and 95% of obese persons who lose weight during non-surgical treatment, regain this weight within several years after treatment (Mann, et al., 2007; Wooley & Garner, 1991). It seems that dieting behaviours are effective in the short term, but lost weight is regained once the dieting intervention stops and some dieters even regain more weight than they lost during the intervention (Mann, et al., 2007; Stroebe, et al., 2013). Given these disappointing results, researchers have questioned whether obesity should be treated at all. For instance, Wooley and Garner (1991) stated that "only by admitting that our treatments do not work- and showing that we mean it by refraining from offering them – can we begin to undo a century of recruiting fat people for failure" (p. 656).

Although some researchers support this conclusion, stating that there is no empirical evidence to support the effectiveness of any form of dieting interventions (e.g., Mann et al., 2007), other researchers emphasize that at least some dieters are successful at maintaining weight loss (e.g., Kraschenwski, et al., 2010; Wing & Hill, 2001). For instance, Kraschnewski and colleagues (2010) reported that one out of six US adults are able to maintain weight loss of at least 10% for more than one year. Also Wing and Hill (2001) concluded in a review study that about 20% of overweight and obese persons are successful in their diets, with success defined as at least 10% weight loss sustained for minimally one year. In other words, some dieters seem to succeed at losing a significant, though modest, amount of

weight and maintain weight loss for a considerable time. Given that such modest weight loss entails clinically significant results, such as decreased cardiovascular disease (e.g., Wing & Hill, 2001), it is important to investigate which factors can contribute to successful weight loss.

Indeed, recent studies in the domain of overweight and obesity focus on which factors and processes differentiate between successful and unsuccessful *weight maintenance*. For instance, in a review, Elfhag and Rössner (2005) concluded that successful weight maintenance (after weight loss) is associated with several factors related to the type of efforts to lose weight, such as having a physically active lifestyle, a regular meal rhythm including breakfast and healthier eating as well as self-monitoring and control over overeating. Interestingly, besides more general resilience factors, such as coping abilities to handle life stress and overall psychological strength and stability, they also found evidence for the importance of several factors related to motivation for eating regulation, such as reaching self-determined goals, "internal" motivation to lose weight, autonomy, assuming responsibility in life, self-efficacy and social support. It seems thus that engaging in healthy eating behaviours and, more broadly, in a healthier lifestyle is predictive of sustained weight loss and that several factors, such as general psychological strength and resilience, as well as motivational factors underlying eating regulation are important to take into account. Despite of research findings pointing towards the importance of motivation, only few studies (but see Williams, Grow, Freedman, Ryan, & Deci, 1996) have used a theoretical perspective on motivation to examine the differential outcomes associated with eating regulation.

The finding that the engagement in a healthy lifestyle, rather than restrictive dieting strategies, was predictive of more adaptive outcomes was also echoed in preventive research on overweight. For instance, Westerberg-Jacobson and colleagues (2012) followed 7 to 11 year old girls for 7 years. They found that the majority of girls developed healthy weight-control techniques, such as eating more vegetables, but that restrictive and extreme

weight-control techniques also increased with age, especially amongst those with a strong wish to be thin. Girls with a BMI over the 75th percentile reported most steep increasing levels of a wish to be thin and extreme weight-control techniques. However, these techniques did not relate to decreased weight over time. In contrast, of the girls who changed their BMI from above the 75th percentile to under the 75th percentile, 34% reported that they had not used any weight-control techniques and others reported engaging in healthy weight-control techniques, such as eating healthy and engaging in physical activity. Together then, these studies point towards the importance of investigating when eating regulation results in healthy eating behaviours as well as when it results in disordered eating symptoms.

An important note is that the above mentioned studies mainly focused on weight as the benchmark of success, with a healthy lifestyle and a lack of disordered eating symptoms as pathways towards weight loss and prevention of overweight. However, healthy eating behaviours and a lack of disordered eating symptoms seem in themselves important outcomes, regardless of their association with weight changes. For instance, a women who has fundamentally changed her lifestyle by engaging in more physical activity and more healthy eating behaviours, but who did not lose a significant amount of weight, is considered an unsuccessful dieter in terms of weight outcomes. In contrast, a women who has succeeded at losing a significant amount of weight, yet at the cost of engaging in unhealthy dieting behaviours (e.g., fasting and vomiting) might be considered a successful dieter if only weight is taken into account. However, long term benefits of eating regulation, in terms of well-being and physical health, are probably more likely to occur among the dieter in the first example, compared to the dieter in the second example, although this claim remains to be investigated. In other words, an *instrumental* view on lifestyle changes, which involves only considering life style changes as far as they lead to weight changes, seems to neglect the fact that the development of a healthy lifestyle and well-being constitute primary outcomes of eating regulation efforts as such (e.g.,

Teixeira, Silva, Mata, Palmeira, & Markland, 2012). In the current dissertation, we aim to investigate the influence of motivation for eating regulation in relation to a broad range of eating outcomes, which are considered clinically important outcomes in themselves, that is, disordered eating symptoms (drive for thinness and binge eating symptoms), healthy eating behaviours, dietary exhaustion and weight changes.

Conclusion

Eating regulation efforts are widely prevalent among girls and women in Western society. The increasing prevalence of eating regulation can be traced back to several sociocultural trends, such as the importance and meaning attached to size and the epidemiologic increase in overweight and obesity. In line with the sociocultural importance and meaning attached to size, eating regulation can be considered an attempt to deal with body dissatisfaction among girls and women who have personally adopted the thin-ideal. In this research domain, the impact of eating regulation efforts on disordered eating outcomes was studied, mainly among normal-weight adolescent and young adult women. Second, in line with the epidemiology of overweight and the presence of an obesogenic environment, eating regulation efforts can also be considered an attempt to stay or become healthy in a so-called toxic environment. Research within this domain points towards the lack of effectiveness of dieting behaviours for sustained weight loss and preventing overweight and, increasingly emphasizes the importance of engaging in a healthy lifestyle rather than the engagement in rigid dietary restraint. This research was mainly conducted among overweight and obese individuals.

In the current dissertation, we want to add to the previous studies by investigating goals and motives underlying eating regulation in relation to a wide range of eating outcomes. As outlined below, the type of motivation underlying eating regulation and the motivational processes of need satisfaction and frustration might bridge the literatures on eating regulation,

such that both adaptive eating outcomes and dysfunctional eating outcomes can be associated with eating regulation, dependent upon the type of motivation underlying eating regulation. Developing such a comprehensive model is in line with recent calls to develop broad and encompassing frameworks (Ogden, 2010; Stroebe, et al., 2013), in which (a) factors and mechanisms are included that can explain both successful and unsuccessful eating regulation and (b) in which a broad range of positive (e.g. weight loss, healthy eating behaviours) and negative (e.g., binge eating, drive for thinness) outcomes of eating regulation is covered. The present dissertation aimed to meet this call by relying on a broader motivational framework, that is, Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000b), to investigate when and why eating regulation yields both adaptive and adverse outcomes. Importantly, such a motivational framework might be used to understand eating regulation efforts and their relation to eating outcomes among diverse groups, such as both normal-weight and overweight individuals and adolescents and adults.

Part II. Self-Determination Theory: Understanding the Relation between Motivational Dynamics and Eating Outcomes

Eating regulation, like the regulation of other health-related behaviours, requires considerable energy (Baumeister & Heatherton, 1996; Vohs & Heatherton, 2000). That is, in an obesogenic environment, dieters are continuously challenged to "use cognitive and attentional resources to override, inhibit, or alter impulses in the service of attaining personal goals or satisfying motives" (Heatherton & Vohs, 1998, p. 214). Within this dissertation, we argue that the energy-depleting character of eating regulation is, at least partially, dependent upon the motivational forces underlying eating regulation. Within SDT, two facets of motivation have received much attention, that is, the type of *goals* people strive to attain with their behaviours (i.e., "What" of behavior) and the types of self-regulatory

styles or *motives* underlying dieting behaviours (i.e., "Why" of behavior, Deci & Ryan, 2000).

The "What" and "Why" of Eating Regulation

Which goals do individuals aim to achieve with their eating regulation efforts? To what extent do they report volitional or rather pressured motives? Given the sociocultural trends described above, individuals' eating regulation efforts might be driven by various motivational sources. Within SDT, the types of goals and the types of motives underlying eating regulation are considered critical as to understand both adaptive as well as dysfunctional outcomes associated with eating regulation.

"What" of eating regulation. Within SDT, a differentiation is made between extrinsic goals, such as image, attractiveness, fame and wealth, and intrinsic goals, such as health, personal development, affiliation, and community contribution (Kasser & Ryan, 1993; Kasser & Ryan, 1996). *Extrinsic* goals are highly valued in a consumer culture, in which the body perfect ideal and material goods are considered essential for a happy and successful live (Dittmar, 2007; Kasser & Kanner, 2004). Despite the belief that the attainment of extrinsic goals will enhance happiness and well-being (Evans, 2003; Sheldon, Gunz, Nichols, & Ferguson, 2010), research within SDT has found that both the pursuit and the attainment of extrinsic goals is unrelated or negatively related to vitality and life satisfaction (Kasser & Ryan, 2001; Van Hiel & Vansteenkiste, 2009; Vansteenkiste, Soenens, & Duriez, 2008). In contrast, the pursuit and attainment of *intrinsic* goals was related to well-being in various studies. Especially when the relative importance attached to extrinsic goals outweighs the pursuit of intrinsic goals, negative effects on well-being are hypothesized to emerge (Kasser & Ryan, 1996; Vansteenkiste, et al., 2008) .

In the context of eating regulation, the goals of *physical attractiveness* and *health* seem particularly relevant. Indeed, given the

importance attached to appearance and thinness in current society, many dieters might be focused primarily on altering their appearance. However, the physical consequences of overweight and obesity might also lead many dieters to focus on maintaining or altering their health. In line with the hypothesis that extrinsic goals relate to less well-being compared to intrinsic goals, Putterman and Linden (2004) found in a sample of female dieters concurrent relationships between appearance-focused eating regulation and the use of more drastic dieting strategies and binge eating symptoms. Health-focused eating regulation was unrelated to these outcomes. Thus, preliminary evidence suggests differential associations between health-focused and appearance-focused eating regulation and eating behaviours. However, more studies are needed to further explore the role of eating regulation goals on eating outcomes, an issue that is addressed in the present dissertation. Specifically, besides a cross-sectional methodology (Chapter 3), also a diary study (Chapter 5) will be used to examine the relation between goal-contents for eating regulation and binge eating symptoms. Further, also the processes underlying the goal-content effect will be examined (Chapter 3 and 5). Moreover, the predictive validity of goal-contents for eating regulation will be pitted against the other critical motivational determinant in SDT, that is, the motives underlying eating regulation (Chapter 5).

"Why" of eating regulation. Dieters not only differ in the type of goals they hope to achieve through their eating regulation, but also in terms of their self-regulatory styles or motives. Traditionally, motivation psychologists differentiated *intrinsic* motivation, in which a person engages in an activity for the inherent pleasure and enjoyment of it, from *extrinsic* motivation, in which a person engages in an activity to achieve goals that are separable from the activity itself (e.g., Deci, 1972; Harter, 1981). However, subsequent empirical work within SDT (Ryan & Connell, 1989) indicated that different subtypes of extrinsic motivation needed to be differentiated, dependent upon the degree to which the value and regulation of the requested behaviour has been *internalized* and integrated. Internalization and

integration is defined as "people's taking in a value or regulation and transforming it into their own so that, subsequently, it will emanate from their sense of self" (Ryan & Deci, 2000b, p. 71). In other words, extrinsically motivated behaviours can vary substantially in the degree to which people feel these activities originate from externally imposed pressures or, in contrast, whether these activities are engaged in more volitionally because people have come to identify with the value and importance of the requested behaviour. The degree of self-endorsement of the behavioral regulation is considered more critical for people's adjustment than whether the behaviour is intrinsically or extrinsically motivated. Therefore, the traditional distinction between extrinsic and intrinsic motivation has been replaced by the distinction between controlled and autonomous motivation (e.g., Vansteenkiste, Lens, & Deci, 2006).

Two subtypes of *controlled* motivation have been distinguished. *External* regulation is the most controlled or pressured form of regulation as individuals are motivated to engage in an activity to obtain promised rewards or contingent appreciation or to avoid punishments and criticism or disappointment from others. Pressures can not only come from the outside, but people can also put themselves under pressure, for instance by buttressing their activity with feelings of guilt, shame, and contingent self-worth, in which case they are said to display *introjected* regulation. Both external and introjected regulations are characterized by feelings of pressure and control and, therefore, are labeled controlled motivation; individuals have the feeling they should stick to their diet. Given the sociocultural pressures to be thin (Stice, 2002) and the stigma surrounding thinness and overweight, many individuals might indeed feel pressured to regulate their eating behaviours. Some individuals might believe that losing weight would result in external rewards, such as more professional success or 'fitting in' more (i.e., external regulation), whereas others might believe that losing weight is necessary to feel less shame and be more satisfied with themselves (i.e., introjected regulation).

Further, three subtypes of *autonomous* motivation are discerned. *Identified* regulation reflects engaging in an activity because one identifies or concurs with the personal importance of doing so. If the importance or value of the behaviour has become an integral part of one's functioning and fits in with broader life goals and values, the behavioural regulation is said to be *integrated*. Finally, when *intrinsically* motivated, one engages in an activity because of the inherent enjoyment and satisfaction the activity provides. Identified, integrated, and intrinsic regulations represent autonomous forms of regulation as people engage in the activity with a sense of choice or willingness in these cases. Individuals might personally choose to regulate eating behaviours because this engenders energy or helps them feel attractive (identified regulation). For some, eating regulation might be integrated with several important life goals. Eating regulation might, for instance, become part of a whole set of personal goals relating to a healthy lifestyle which, in turn, might result in the necessary energy to take up other life goals, such as being an active and involved parent or going on a biking trip with friends. Importantly, eating regulation might even become enjoyable. For instance, individuals can gain pleasure in cooking healthy meals or they might enjoy exploring different kinds of foods they did not know of before (Teixeira, et al., 2012).

A few previous studies have examined the relations between autonomous and controlled eating regulation and eating behaviours. For instance, Pelletier and colleagues (Otis & Pelletier, 2008; Pelletier & Dion, 2007; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004) found autonomous eating regulation to be associated with more healthy eating behaviours (e.g., eating more vegetable and fruits) and fewer bulimic symptoms, whereas controlled eating regulation revealed an opposite pattern to these outcomes. Further, autonomous eating regulation predicted a reduction in percentage of calories from total and saturated fats over a 26-week period in a group of individuals at risk for coronary heart disease. Further, autonomous versus controlled eating regulation also predicts a different type of eating

regulation. For instance, autonomous eating regulation was associated with the intention to eat more healthy foods, whereas controlled eating regulation was associated with more restrictive dieting behaviours, that is, the intention to avoid eating too many calories and making a list of forbidden foods (Otis & Pelletier, 2008). Other studies demonstrated that highly controlled, relative to autonomous dieters, displayed more extreme and rigid dieting behaviours across a 5-month period (Strong & Huon, 1999).

Together then, these studies offer preliminary evidence that the distinction between autonomous and controlled motivation is relevant in the domain of eating regulation. However, more studies are needed to better understand the influence of motives underlying eating regulation on eating outcomes. That is, methodologically, previous studies were limited by their (main) use of student samples and by the reliance on cross-sectional or short-term longitudinal methods. In the current dissertation, we included samples of individuals who declared they were currently on a diet (i.e., self-declared dieters) of varying age and weight status (Chapters 4 and 5) and used varying study designs, that is, a longitudinal study with an 18-month interval (Chapter 4) and a diary study in which eating outcomes were assessed on a day-to-day basis during one week (Chapter 5). Conceptually, we also aimed to extend previous studies by investigating the unique role of the separate motives, thereby allowing a detailed examination of intrinsic, identified, introjected and external motives in relation to changes in eating outcomes (Chapter 4), by investigating the role of motives in combination with the goals underlying eating regulation (Chapters 5), by examining the processes linking eating regulation motives and eating outcomes (Chapter 4 and 5) and, finally, by investigating the influence of motives on a broad range of outcomes, that is disordered eating symptoms and healthy eating behaviours (Chapters 4 and 5), weight changes and dietary exhaustion (Chapter 5).

Why does the Type of Motivation Matter? Basic Psychological Needs as Explanatory Mechanisms

Why would some types of goals and some types of motives yield more adaptive eating outcomes, whereas other types of goals and motives are associated with dysfunctional eating outcomes? The satisfaction and frustration of a set of fundamental psychological needs is said to play a pivotal role in these associations. Indeed, central within SDT is the concept of basic psychological needs, which are defined as the psychological nutriments necessary for growth and well-being (Ryan & Deci, 2000). Three innate psychological needs are discerned, that is, (1) the need for autonomy (i.e., experiencing a sense of volition and willingness), (2) the need for competence (i.e., experiencing a sense of effectiveness) and (3) the need for relatedness (i.e., experiencing a sense of reciprocal care and support). SDT has maintained that "a full understanding not only of goal-directed behaviour, but also of psychological development and well-being, cannot be achieved without addressing the needs that give goals their psychological potence and that influence which regulatory processes direct people's goal pursuits." (Deci & Ryan, 2000, p. 228).

The concept of basic psychological needs is part of SDT's viewpoint on human nature (e.g., Deci & Ryan, 2000). That is, at a meta-theoretical level, SDT holds the assumptions that human beings have an inherently proactive nature and, through their pro-activity, humans move steadily towards increasing levels of psychological growth and integration. The satisfaction of the three basic psychological is considered necessary for this pro-active and growth-oriented functioning to get activated and unfold.

In line with these claims, abundant research has confirmed the growth-promoting role of the satisfaction of the psychological needs at the general level (i.e., across life domains) as well as at the domain level (e.g., work, sports, schooling). Further, these positive effects did not only emerge at the between-person ((for an overview see Vansteenkiste, Niemiec, & Soenens, 2010), but also at the within-person level, with variations in

psychological need satisfaction covarying with variation in positive affect and vitality (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan, Bernstein, & Brown, 2010; Sheldon, Ryan, & Reis, 1996). Further, the importance of psychological need satisfaction for well-being has been confirmed in a wide variety of diverse cultures (Chen, 2013).

Although SDT has been typically concerned with identifying the optimal conditions for nurturing well-being (e.g., vitality) and positive outcomes (e.g., intrinsic motivation, prosocial behavior), over the past few years, more attention has been devoted to the "dark side" of human functioning (Ryan & Deci, 2000a). This dark side is said to emerge when the psychological need get actively blocked or thwarted, thereby engendering passivity and psychopathology as well as coping responses aimed at achieving a derivative sense of need satisfaction (Ryan & Deci, 2000a). Critical for the study of psychopathology in SDT is the recognition at the theoretical level that low need satisfaction does not necessarily imply need frustration (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011; Vansteenkiste & Ryan, 2013). That is, when the psychological needs get deprived or are not nurtured, it does not imply that they are actively thwarted. To illustrate, adolescents might experience little support from their parents (i.e., low relatedness satisfaction), but it is only when they experience tension and conflict, that their need for relatedness gets frustrated. In a similar vein, individuals may feel like they are not always able to choose interesting and nurturing activities (low autonomy satisfaction), which is different from feeling actively pressured to behave in a particular way (autonomy frustration). As for competence, individuals might feel they are not always capable at achieving their goals (low competence satisfaction), which is different from feeling like a failure (competence frustration).

Consistent with this distinction, it has been recently shown that the frustration of the psychological needs, rather than the mere deprivation of

need satisfaction, is particularly important in the etiology of maladaptive outcomes and psychopathology, such as physical symptoms of acute stress, burnout, depressive symptoms and negative affect (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011; Stebbings, Taylor, Spray, & Ntoumanis, 2012). With regard to eating behaviours, psychological need frustration might result in a strong focus on extrinsic goals, such as appearance and body image (Thogersen-Ntoumani & Ntoumanis, 2007; Thogersen-Ntoumani, Ntoumanis, Cumming, & Chatzisarantis, 2011; Thogerson-Ntoumani, Ntoumanis, & Nikitaras, 2009) as well as into compensatory behaviours, such as rigid dieting behaviours and excessive concerns over eating and weight (Soenens, Luyckx, et al., 2008) or engaging in binge eating symptoms (Boone, Vansteenkiste, Soenens, Van Der Kaap-Deeder, & Verstuyf, in press; Schueler & Kuster, 2011). Importantly, these compensatory behaviours and need substitutes may not only result from need frustration, but may also perpetuate need frustration because people tend to remain focused on the "wrong" behaviours and goals such that dysfunctional outcomes associated with need frustration get aggravated (Deci & Ryan, 2000; Vansteenkiste, et al., 2008). In Chapter 6 of the current dissertation, the relation between need frustrating experiences and binge eating symptoms was investigated on a day-to-day basis. Specifically, measures of daily psychological need satisfaction and frustration as well as binge eating symptoms were assessed on 14 consecutive days. Such a diary design allowed us to examine whether the previously described relationships between need frustration and disordered eating symptoms at the interpersonal level can also be confirmed at the within-person (i.e., day-to-day) level.

People's psychological needs can not only be frustrated or satisfied in general in their lives (i.e., across life domains), but such need satisfaction and frustration can also occur in more specific life domains. For instance, individuals can feel volitional, competent, and well-supported in their eating

regulation efforts (i.e., diet-specific need satisfaction) and they can feel pressured, like a failure and isolated in their eating regulation efforts (i.e., diet-specific need frustration).

Further, the level of experienced need satisfaction and frustration is hypothesized to explain why some types of goals and some types of motives yield more adaptive outcomes (Deci & Ryan, 2000). Specifically, health-focused goals and autonomous motives are hypothesized to relate to adaptive eating outcomes, because of their positive associations with diet-specific need satisfaction, whereas appearance-focused goals and controlled motives are hypothesized to relate to dysfunctional eating outcomes because of their positive associations with diet-specific need frustration. Empirical support for the explanatory role of domain-specific need satisfaction was found in diverse life domains, such as work (Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008) and physical exercise (Standage, Duda, & Ntoumanis, 2006), yet, no studies had additionally examined the role of diet-specific need frustration in the domain of eating regulation. In the current dissertation, we investigated whether the process of diet-specific need frustration was involved in the relation between eating regulation goals and motives and eating outcomes in Chapters 3, 4 and 5. Further, in Chapter 4, the differential role of diet-specific need satisfaction and diet-specific need frustration was investigated. The current dissertation was among the first to explore the mediating role of diet-specific need satisfaction and frustration in the relation between eating regulation goals and motives and eating outcomes.

Conclusion

Motivation research distinguishes between the "What" and "Why" of motivation. In line with this distinction, individuals might vary in the goals (i.e., appearance versus health) and motives (i.e., controlled versus autonomous) that drive them to regulate their eating behaviours. Dependent on the type of goals and motives, differential relationships with eating

outcomes are expected to occur. Although preliminary research confirms the differential roles of appearance-focused and health-focused eating regulation and the differential roles of controlled and autonomous eating regulation, more studies are needed among varying samples of individuals and using varying methodological designs. Further, a central premise within SDT holds that the satisfaction of the psychological needs for autonomy, competence and relatedness are necessary nutrients of psychological growth and well-being. Especially need frustrating experiences, rather than the mere lack of need satisfaction, would relate to pathological outcomes, including disordered eating symptoms. In the current dissertation, psychological need satisfaction and frustration will be examined at a general level in the prediction of daily experiences of binge eating symptoms and at a specific level in the relation between eating regulation goals and motives and diverse eating outcomes. These studies will be the first to explore diet-specific need satisfaction and frustration as intervening processes.

Part III. Research Aims of the Dissertation

Given the current state of affairs in the literature, we identified five general aims which we addressed throughout this dissertation. These aims are outlined below.

Aim 1: Providing a Comprehensive Motivational Model on Eating Regulation

As noted above, the role of eating regulation in relation to eating outcomes has been examined in several research domains, including the field of body image concerns and overweight and obesity. Yet, these fields have been developed fairly independently, with little interaction between them. More recently, researchers have called for the development of more comprehensive models, compromising of both healthy and disordered eating behaviors and capturing both adaptive and dysfunctional processes in eating regulation. Herein, it is maintained that an examination of the motivational

dynamics, from a theory-driven perspective, involved in eating regulation would allow for the development of a more encompassing model. The first aim of this dissertation was then to provide a comprehensive theoretical model on the role of motivational dynamics in eating regulation. This aim was addressed in Chapter 2, in which previous studies on the relation between motivation and eating outcomes were thoroughly reviewed. Based upon this review, as well as on the theoretical tenets of SDT, a comprehensive motivational model on eating regulation was proposed, which also served as the theoretical basis for subsequent empirical studies (Chapters 3 through 7) in this dissertation. Apart from proposing this motivational model, the model was compared to a few prevailing theories and models in the domains of body image concerns and eating behaviours.

Aim 2: Examining the Relations between the "What" and "Why" of Eating Regulation and Eating Outcomes

The second aim was to examine the relationships between the "What" and "Why" of eating regulation and eating outcomes. Although much attention was devoted to the study of relationships between the degree or intensity of eating regulation and eating behaviours, very few studies examined the role of different aspired goals underlying eating regulation. That is, dieters could be highly motivated to take care of their diet, yet, they may aspire different goals by doing so. To our knowledge, only Putterman and Linden (2004) investigated relations between appearance-focused and health-focused eating regulation and binge eating symptoms. In Chapter 3, we aimed to build on this study by investigating the concurrent relation between eating regulation goals and binge eating symptoms in a group of adolescents, while Chapter 5 extended this work by relying on a diary method (instead of a cross-sectional design), including a broader variety of outcomes (i.e., drive for thinness, binge eating symptoms and healthy eating behaviours) and by examining whether the observed associations of the "What" of eating regulation would stand after controlling for the "Why" of

eating regulation. We hypothesized that the type of goals underlying eating regulation would be predictive of binge eating symptoms apart from the contribution of the quantity of eating regulation efforts as such (Chapter 3) and that the effects of the type of goals would not be limited to binge eating symptoms, but would radiate to a broader range of eating outcomes, such as healthy eating behaviours and drive for thinness (Chapter 5). Overall, the simultaneous investigation of the role of both appearance-focused eating regulation and health-focused eating regulation allowed us to shed light on different paths to eating behaviours, with health-focused eating regulation representing the more adaptive path and appearance-focused eating regulation representing the more dysfunctional path.

Compared to studies on eating regulation goals, more research attention was devoted to the role of eating regulation motives in eating outcomes (Pelletier & Dion, 2007; Pelletier, et al., 2004). Yet, the majority of these studies were cross-sectional, which prevents one from concluding whether motives for eating regulation can predict changes in these eating outcomes over time. Further, these studies were mainly conducted among students rather than dieters. In Chapter 4, we aimed to extend this body of work by investigating associations between eating regulation motives and 18-month changes in a variety of eating outcomes (i.e., binge eating behaviours, drive for thinness, dietary exhaustion and weight loss) in a group of self-declared dieters of varying weight status (normal-weight, overweight and obese) participating in a Weight Watchers program. We hypothesized that more autonomous (i.e., intrinsic and identified) motives for eating regulation would relate to increases in adaptive eating outcomes, whereas more controlled (i.e., introjected and external) motives would relate to increases in dysfunctional eating outcomes. Further, Chapter 5 extended Chapter 4 by using a diary methodology, examining whether the "Why" of eating regulation would continue to predict outcomes when controlling for the "What" of eating regulation and examining whether motives would play

a (dis)similar role in a group of late-adolescent and adult dieters and normal-weight and overweight dieters.

Aim 3: Examining the Processes of Need Satisfaction and Need Frustration

The processes of need satisfaction and need frustration might be involved in eating outcomes. Previous studies indicated that a lack of general need satisfaction is related to restrictive and rigid eating behaviours (e.g., Soenens, Vansteenkiste, et al., 2008) and binge eating symptoms (e.g., Schueler & Kuster, 2011). Further, need frustration, rather than the mere lack of satisfaction, was found to predict disordered eating symptoms in one previous study (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011). In the current dissertation, we aimed to extend these studies by examining the role of general need satisfaction and frustration in relation to binge eating symptoms on a day-to-day basis. Further, no previous studies have investigated the role of diet-specific need satisfaction and frustration in relation to eating outcomes. In the current dissertation, we investigated associations between diet-specific need frustration and binge eating symptoms (Chapter 3, 4 and 5), drive for thinness (Chapters 4 and 5) and dietary exhaustion (Chapter 4). Further, the presumed distinct role diet-specific need satisfaction and frustration in the prediction of dysfunctional and adaptive eating outcomes was also investigated in Chapter 4. We expected that need frustration in particular would relate to dysfunctional eating outcomes, whereas need satisfaction might be more predictive adaptive eating outcomes. Finally, we examined whether the processes of diet-specific need satisfaction and frustration would mediate the relationships between the type of motivation for eating regulation and eating outcomes. The intervening role of diet-specific need frustration on the relations between the "what" and "why" of eating regulation and eating behaviours was tested in Chapters 3, 4 and 5, whereas the intervening role of need satisfaction was tested in Chapter 4.

Aim 4: Examining the Role of Weight Status and Age

A fourth aim of this dissertation involved examining the motivational profiles of self-declared dieters. More specifically, we wanted to investigate whether the type of goals and type of motives, together constituting a motivational profile, of dieters would be dependent upon weight status and age group. As for weight status, overweight and obese dieters might engage in eating regulation more often for health-related goals. Because being overweight has several physical risks (Haslam & James, 2005), health goals might be more salient in overweight, compared to normal-weight, dieters. Further, because overweight and obese persons are subjected to more discrimination (Ogden, 2010), they might feel more pressured to engage in eating regulation compared to normal-weight dieters. In Chapters 4 and 5 the motivational profile of self-declared normal-weight and overweight dieters was compared. We expected overweight dieters to report more controlled motives (Chapter 4 and 5) and more health-focused eating regulation (Chapter 5) compared to normal-weight dieters.

Second, the motivational profiles of late-adolescent and adult self-declared dieters were compared. Do younger dieters focus more often on appearance compared to adult dieters? And do younger dieters perceive more pressures to regulate their eating behaviours? Previous studies indicated that younger women are more vulnerable to experience body image concerns and to take in sociocultural pressures to be thin (Hausenblas, et al., 2013). Further, given that SDT claims that humans increasingly move towards greater level of integration across the life span (Sheldon & Kasser, 2001), adult dieters may report more health-focused eating regulation and autonomous motives and less appearance-focused eating regulation and controlled motives compared to younger dieters. (Chapter 5).

Besides of examining differences in motivational profiles, it was also investigated whether the relationships between the type of motivation for eating regulation and eating outcomes would be dependent on the weight status and age of dieters. Indeed, some might argue that pressure is good for

some, especially for those who are in need of change. However, from the perspective of SDT, psychological need satisfaction is presumed to be universally important (Chen, 2013) and therefore, controlled motives and appearance-focused eating regulation were expected to yield adverse outcomes, independent of dieters' age or weight status. In Chapters 4 and 5 structural differences in the relations between motivation and eating outcomes were examined through multi-group testing. Based on SDT, we expected that the correlates of appearance-focused eating regulation and controlled motives would be similar in different weight and age groups.

Aim 5: Investigating Antecedents of Appearance-Focused Eating Regulation: Body Dissatisfaction and Identity Styles

Given that appearance-focused eating regulation is associated with disordered eating symptoms (e.g., Putterman & Linden, 2004), it is important to investigate why some adolescents engage in appearance-focused eating regulation rather than in health-focused eating regulation. A final aim of this dissertation was then to investigate associations between body dissatisfaction and appearance-focused and health-focused eating regulation (Chapter 1) and between identity styles, adoption of the body perfect ideals and appearance- and health-focused eating regulation (Chapter 7).

Studies on eating regulation within the domain of body image often neglected the possibility that eating regulation could also be driven by health concerns rather than being only rooted in body dissatisfaction (e.g., Ogden, 2010). The differentiation between health-focused and appearance-focused eating regulation opened the possibility to investigate whether body dissatisfaction would be related to any kind of eating regulation or rather relate specifically to appearance-focused eating regulation. Indeed, some adolescents might regulate their eating pattern to remain healthy and fit rather than to alter their appearance. Health-focused eating regulation, then, might represent a more adaptive path towards healthy eating behaviours and

a healthier weight. Because body dissatisfaction is more likely to involve appearance than health concerns, we expected body dissatisfaction to be more strongly related to appearance-focused than to health-focused eating regulation (Chapter 3).

Further, not only body dissatisfaction but also the adoption of the body perfect ideal, to which adolescents are continuously exposed, may predict the type of goals they aim to achieve through eating regulation (Thompson & Stice, 2001). Specifically, adoption of the body perfect ideal is likely to relate to increases in appearance-focused eating regulation. Indeed, the body perfect ideals are extreme and only few, if any, adolescents meet the standards of the current body perfect ideal (e.g., Dittmar, 2007).

However, not all adolescents adopt the body perfect ideals to the same extent and some even take a critical stance against these ideals (Groesz, et al., 2002). Therefore, it seems important to examine vulnerability factors which explain why some adolescents are more prone to adopt the body perfect ideal than others (Dittmar, 2007). During adolescence, youngsters face the challenge to figure out who they are and which goals and values are important to them. Previous research indicated that problematic identity development was related to disordered eating symptoms among both boys and girls (Vartanian, 2009; Wheeler, Adams, & Keating, 2001; Wheeler, Wintre, & Polivy, 2003). Also the cognitive style used to construct one's identity might play a significant role. That is, the style used by adolescents to construct their identity has been found to differ between adolescents, with some adolescents using an information-oriented style, whereas others use a normative style or a diffuse-avoidant style (Berzonsky, 1990). The style used to construct one's identity might be differentially related to adoption of the body perfect ideal, which in turn would be related to a differential focus on appearance-focused and health-focused eating regulation.

In Chapter 7, longitudinal associations between identity styles at baseline, adoption of body perfect ideals at Time 2 and health-focused and

appearance-focused eating regulation at Time 3 were investigated. We expected that youngsters making use of a normative or diffuse-avoidant style would be more prone to adopt the body perfect ideal, which in turn would relate to increases in appearance-focused eating regulation, whereas youngsters with an information-oriented style might become more critical towards the body perfect ideal and, thus, engage less frequently into appearance-focused eating regulation.

Given that recent studies on body image concerns indicate that also boys are increasingly prone to develop body image concerns (Esnaola, et al., 2010), it was deemed important to include boys as well in this study. That is, like for girls, boys with a normative or diffuse-avoidant identity style might be more prone to adopt the muscular ideal, which, in turn, might relate to appearance-focused eating regulation. We expected that boys on average would report less adoption of the body perfect ideals and less eating regulation, but that the relationships between these constructs would be similar.

Part IV. Overview of the Empirical Chapters

These five aims were addressed throughout six chapters, which comprise a review study and five empirical studies. In Chapter 2 a review of the literature on motivation and eating behaviours is provided as well as a comprehensive model on motivation and eating regulation from the perspective of SDT is proposed. The proposed motivational model was then compared to some prevailing models in the literature on body image and obesity. In Chapter 3, we aimed to investigate whether the type of goals (i.e., appearance-focused and health-focused) underlying eating regulation would be differentially related to diet-specific need frustration and binge eating symptoms in a group of adolescent students above and beyond the contribution of the intensity of eating regulation as such. Further, body dissatisfaction was examined as antecedent of both the degree of eating regulation and the type of goals underlying eating regulation. Next, Chapter

4 presents a longitudinal study in which associations between motives for eating regulation and changes in healthy as well as disordered eating behaviours and weight were examined in a group of (mainly female) adult self-declared dieters participating in a Weight Watchers program. In addition, the mediating role of diet-specific need satisfaction and frustration was tested. Finally, the motivational profile of dieters, as well as structural differences in the relationships between normal-weight, overweight and obese dieters, were explored. In Chapter 5, the goals and motives for eating regulation were simultaneously examined in relation to healthy eating behaviours and disordered eating symptoms in a group of late-adolescent and adult self-declared dieters. The intervening role of diet-specific need frustration was tested, as well as differences in motivational profile and structural relationships according to age and weight status. Chapter 6 focuses on the relationship between general need frustration and binge eating behaviours. It was examined whether daily fluctuations in general need frustration would be related to daily fluctuations in binge eating symptoms. Finally, in Chapter 7, the role of identity styles and adoption of the body perfect ideal as antecedents of appearance-focused and health-focused eating regulation was examined in a group of male and female adolescents. Table 1 provides a brief overview of several characteristics (i.e., study design, sample, variables) of each of the conducted empirical studies.

Table 1

Overview of the empirical studies

	Total *N* (at T1)	Design	Age range	% Female	Type of sample	Predictor and mediating variables	Outcomes
Chapter 3	244	Cross-sectional	13-19	100%	Students	Eating regulation goals Diet-specific need frustration	Binge eating symptoms
Chapter 4	458	Longitudinal (18 months interval)	17-74	95%	Self-declared dieters, participating in Weight Watchers	Eating regulation motives Diet-specific need satisfaction and frustration	Healthy eating behaviours Binge eating symptoms Drive for thinness Weight changes Dietary exhaustion
Chapter 5	198	Diary Study (1 week)	16-23 35-55	100%	Self-declared dieters	Eating regulation goals and motives Diet-specific need frustration	Healthy eating behaviours Binge eating symptoms Drive for thinness
Chapter 6	302	Diary Study (2 weeks)	14-23	100%	Students	General need satisfaction and frustration	Binge eating symptoms
Chapter 7	418	Longitudinal (2 years)	12-18	54,3%	Students*	Identity styles Adoption Body Perfect Ideal	Eating regulation goals

Note. Participants in Chapter 3 and Chapter 7 were overlapping, such that female participants participating in Chapter 3 also took part in the longitudinal study at wave 2 in Chapter 7.

Chapter 2

Motivational Dynamics of Eating Regulation: A Self-Determination Theory Perspective[1]

Within Western society, many people have difficulties adequately regulating their eating behaviours and weight. Although the literature on eating regulation is vast, little attention has been given to motivational dynamics involved in eating regulation. Grounded in Self-Determination Theory (SDT), the present contribution aims to provide a motivational perspective on eating regulation. The role of satisfaction and thwarting of the basic psychological needs for autonomy, competence, and relatedness is introduced as a mechanism to (a) explain the etiology of body image concerns and disordered eating and (b) understand the optimal regulation of ongoing eating behaviour for healthy weight maintenance. An overview of empirical studies on these two research lines is provided. In a final section, the potential relevance and value of SDT in relation to prevailing theoretical models in the domain of eating regulation is discussed. Although research on SDT in the domain of eating regulation is still in its early stages and more research is clearly needed, this review suggests that the SDT represents a promising framework to more thoroughly study and understand the motivational processes involved in eating regulation and associated problems.

[1] Verstuyf, J., Patrick, H., Vansteenkiste, M., & Teixeira, P. J. (2012). Motivational dynamics of eating regulation: A self-determination theory perspective. *International Journal of Behavioural Nutrition and Physical Activity*. *9*: 21.

Introduction

During the past half-century, the Western world has witnessed an intriguing paradox in the domain of eating regulation: an increase in body image concerns and restrictive eating (Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; Thompson & Stice, 2001) has occurred in conjunction with a dramatic rise in overweight and obesity (Ogden, Yanovski, Carroll, & Flegal, 2007). Although somewhat ironic, this is not entirely surprising given the proliferation of conflicting advertisements for foods that are highly energy-dense and images of extraordinarily thin models in fashion and movies (Polivy & Herman, 2004; Wolf, 1990). Failures in eating regulation have been found to culminate in a variety of physical and mental health risks. For instance, body image concerns are associated with more unhealthy weight control behaviours and lower well-being (Stice, 2001). Problems in weight management, such as overweight and obesity, are associated with lower self-esteem and greater health risks (e.g., coronary heart disease; Bray, 1986; WHO, 1997). And disordered eating, such as more extreme forms of restrictive or disinhibited eating, and unhealthy weight control behaviours such as purging or use of laxatives or diuretics, are associated with a variety of psychological (e.g., low self-esteem) and health risks (e.g., heart failure risks; Halmi, 1995; Treasure & Szmukler, 1995).

As a consequence of the high prevalence of problematic eating regulation and the psychological and physical health costs associated with these behaviours, several public health efforts have been launched to prevent and reduce these eating regulation problems. Further, in the academic arena, a number of theoretical models have been developed to study factors that contribute to the genesis and maintenance of these behaviours. Some models, like the Thin-Ideal Internalization Model (Thompson & Stice, 2001) and Self-Objectification Theory (Frederickson & Roberts, 1997) attempt to explain the etiology of body image concerns, while other models, such as the Dietary Restraint Theory (Polivy & Herman, 1985) and the Self-Control

Model (Baumeister & Heatherton, 1996), focus on the dynamics involved in failures of eating regulation for healthy weight management.

Eating regulation can encompass a range of behaviours and goals, such as choosing healthy foods, restrictive restraint, weight management, and disordered eating. Within each of these dimensions, some processes are likely to be more salient than others. For instance, a focus on the thin-ideal and perfectionist functioning might be more salient among anorectic women compared to binge eating women. Indeed, browsing through web of science, it becomes clear that more studies examined the role of the thin-ideal and perfectionism in anorectic eating behaviours compared to binge eating behaviours (61 versus 11 hits and 316 versus 63 hits). Similarly, autonomous motivated eating regulation is studied relatively frequent in groups of obese patients, whereas it has rarely been studied with eating disordered patients. In other words, research has remained somewhat divided across the diverse dimensions of eating behaviours, with specific theoretical perspectives being developed for specific eating behaviours (Ogden, 2010). Although it is important to examine which processes are more typical for specific eating behaviours, we maintain it is equally important to consider the more global motivational processes involved in eating regulation, an issue that can be addressed by relying on more general theories on motivation and personality development, like Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000).

SDT offers a broader perspective on human functioning and has broad-reaching applications in a wide variety of contexts, such as education, exercise, work, relationships, psychopathology and psychotherapy (Ryan & Deci, 2008; Vansteenkiste, Niemiec, & Soenens, 2010). SDT may also provide a framework to understand the myriad behaviours involved in eating regulation. Specifically, the concept of basic psychological needs, as conceived within SDT, can add to our understanding of the etiology of adaptive and disordered forms of eating regulation as well as to motivational processes involved in day-to-day eating regulation. Furthermore, although

some motivational processes might be more salient in specific eating regulation problems, the consequences of the motivational basis for eating regulation would be similar across the range of eating behaviours. In general, need thwarting experiences relate to less adaptive and more disordered forms of eating regulation, whereas need satisfying experiences relate to more adaptive and less disordered forms of eating regulation. For instance, although a focus on the thin-ideal might be more salient among anorectic women, to the extent that obese women are focused on this ideal and need-thwarting experiences are provoked, we hypothesize similar maladaptive consequences of this motivational goal in this group of women. Therefore, the same motivational processes can relate to the understanding of models that have been developed for body image concerns (e.g., Thin-Ideal Internalization Model, Self-Objectification Theory) as well as to models developed for dieting, weight control, and binge eating behaviours (e.g., Dietary Restraint Theory, Self-Control Model).

SDT is comprised of five different mini-theories (Vansteenkiste, et al., 2010), with some of them yielding more direct relevance for the understanding of eating regulation than others. Therefore, rather than presenting these five mini-theories in an exhaustive and theory-driven fashion, we chose to organize this paper around three larger sections, that is, (1) 'The Role of Psychological Needs in the Etiology of Disordered Eating '; (2) 'The Role of Psychological Needs in the Optimal Regulation of Eating Behaviours'; and (3) 'SDT in Relation to Current Perspectives on Body Image Concerns and Eating Regulation'. In the first part, we discuss the basic theoretical tenets of SDT and describe their relevance for the etiology of disordered eating (see Figure 1). Following the theoretical tenets, an overview of empirical evidence is provided and remaining research questions are addressed. In the second part, the relevance of SDT for the ongoing regulation of eating behaviours is discussed (see Figure 2), followed by a review of supporting empirical evidence and remaining research questions. Finally, in the third part, we briefly discuss the potential relevance

and added value of SDT for some prevailing theoretical models in the domain of eating regulation.

The Role of Psychological Needs in the Etiology of Disordered Eating

Need Substitutes and Compensatory Behaviours: A Self-Determination Theory Perspective

As a meta-theory of human motivation, SDT begins with three key assumptions. The first is that human beings are inherently proactive, that they have the potential to act on and master both the internal (i.e., drives and emotions) and the external (i.e., environmental) forces they encounter, rather than being passively controlled by those forces (Ryan & Deci, 2000). Second, SDT assumes that through their activity humans steadily move towards increasing levels of psychological growth and integration. Third, SDT acknowledges that, despite this innate tendency, characteristics of the social context may support or thwart growth and integration (Ryan & Deci, 2000). Thus, SDT integrates both the role of the person – their inner resources and capacity for growth – and the role of the social context in human motivation.

SDT has placed primary importance on psychological needs because the satisfaction or thwarting of these psychological needs plays a critical role in the process of growth and integration. Within the SDT framework, basic psychological needs are defined as the psychological nutriments necessary for growth and integration (Ryan & Deci, 2000). Using this definition, SDT has identified three basic needs: competence, relatedness, and autonomy. Competence reflects the need to feel efficacious and capable of achieving desired outcomes. Although not necessarily defined as an innate need, the issue of self-efficacy has been emphasized in many other theories of human motivation that have been applied to the study of eating regulation (e.g., social cognitive theory). Relatedness involves the need to feel close to and valued by important others, to have a sense of belonging with peers, family, and community. Finally, autonomy is the need to feel volitional, as the

originator of one's actions in carrying out an activity. Just as the satisfaction of one's physiological needs (e.g., hunger) is critical for one's physical survival, the satisfaction of one's basic psychological needs is critical for psychological thriving and well-being (Deci & Ryan, 2000).

Beyond theoretical conjecture, an impressive body of research conducted in various cultures with individuals across the life course has demonstrated the importance of need satisfaction for physical and mental health including higher well-being (e.g., life satisfaction, vitality), less ill-being (e.g., depression, anxiety), and better health (Ryan & Deci, 2008; Vansteenkiste, et al., 2010). Such findings have been reported at the interindividual level (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010) and at the intrapersonal level, with diary studies demonstrating that daily well-being fluctuations co-vary with daily variation in the satisfaction of one's basic psychological needs (Ryan, Bernstein, & Brown, 2010).

The satisfaction versus thwarting of psychological needs is involved in the etiology of psychopathology (Ryan, Deci, Grollnick, & LaGuardia, 2006). When people chronically fail to have the three basic psychological needs met, they develop strategies to deal with this psychological deficit. Two maladaptive coping responses discussed within SDT involve the development of need substitutes and the engagement in compensatory behaviours (Deci & Ryan, 2000; Ryan, et al., 2006; see paths A and B in Figure 1).

Need substitutes. Need substitutes are defined as goals that people engage in to compensate for a lack of experienced need satisfaction (Deci & Ryan, 2000; Kasser & Ryan, 1996). SDT distinguishes between extrinsic goals, such as popularity, physical attractiveness, and financial success, and intrinsic goals, such as personal growth, contributing to the community, personal relationships, and health. Extrinsic goals are very salient in a consumer culture, where fame, money, and the 'perfect body' (Dittmar, 2007; Kasser & Kanner, 2004) are portrayed as signs of success

(Vansteenkiste, Soenens, & Duriez, 2008). The appeal of such goals lies mainly in the anticipated power, social approval, or sense of worth that individuals expect from attaining them (Kasser, Ryan, Couchman, & Sheldon, 2004; Sheldon, Gunz, Nichols, & Ferguson, 2010) . Although such goals or behaviours hold the promise of being satisfying and rewarding in the short term, they may interfere with genuine need satisfaction and therefore typically fail to yield long-term well-being benefits (Van Hiel & Vansteenkiste, 2009). The experience of repeated need thwarting results in susceptibility to cultural messages touting that the pursuit and attainment of extrinsic goals brings happiness. Indeed, repeated need thwarting has been associated with feelings of insecurity and a resulting quest for external indicators of worth, which align with SDT's conceptualization of extrinsic goals (Ryan, et al., 2006). Children raised in a social environment deprived of need support and nurturance are more likely to pursue extrinsic, relative to intrinsic, goals (Kasser, Ryan, Zax, & Sameroff, 1995). Also, children who feel unaccepted by their peers (i.e., thwarting of relatedness needs) experience more peer pressure to have the right 'stuff' and a stronger endorsement of materialistic values (Banerjee & Dittmar, 2008). Importantly, not all extrinsic goals studied within SDT may be relevant in the context of eating regulation and body image concerns. Physical appearance and body image as need substitutes seem particularly relevant to eating regulation. For instance, people who adopt the thin-ideal, which represents a more extreme and socially prescribed form of physical attractiveness, experience more body image concerns and report more restrictive and problematic dietary behaviours (Thompson & Stice, 2001).

Compensatory behaviours. A second response to need thwarting involves the engagement in compensatory behaviours. Some people cope with need thwarting experiences by releasing or even revolting against self-control. For instance, need thwarting has been associated with alcohol abuse (Knee & Neighbors, 2002) and tobacco smoking (Williams, Niemiec, Patrick, Ryan, & Deci, 2009). In a similar vein, people may try to handle

their need thwarting experiences by excessive eating or uncontrolled eating. The "escape-of-awareness" model (Heatherton & Baumeister, 1991) proposes that binge eating is a motivated attempt to escape awareness. To escape emotional distress, often provoked by high standards and self-criticism, binge eaters divert their attention away by narrowing the attention to immediate stimuli in the environment. Also in the affect regulation model (Gross, 2007), binge eating is considered a mechanism to cope with negative emotions. Similarly, the experience of need thwarting relates to excessive or uncontrolled eating because one tries to overcome negative affect associated with need thwarting experiences – in this case, using food as the substance of choice, analogous to what has been found with tobacco use and problem drinking.

Another compensatory behaviour proposed within SDT is the development of rigid behaviour patterns. People engage in such behaviours to obtain a sense of structure, predictability, and security in their lives. However, because people regulate their behaviour in an inflexible and sometimes even compulsive fashion, they likely direct attention away from the deeper causes of their experienced need thwarting. In addition, they are prone to experience ill-being when they are unable to persist in their rigid functioning. An example of rigid behavioural patterns involves setting high, perfectionist standards. When confronted with the repeated failure to fulfill basic psychological needs, an individual might turn toward the pursuit of perfectionist standards in an attempt to prove one's worth to both oneself and one's surroundings. These high standards are pursued in a rigid fashion and are typically accompanied by dichotomous or "black-white" thinking (Shafran & Mansell, 2001). Even a small failure to achieve these high standards gives rise to intense feelings of guilt, inferiority, and self-criticism. Instead, experiences of success are short-lived and are typically attributed to external and unstable causes (e.g., luck). Following success, individuals who hold perfectionist standards therefore typically raise their standards, thereby

further reinforcing their relentless pursuit of perfection (Blatt, 1995; Gross, 2007; Shafran & Mansell, 2007).

In the context of eating regulation, rigid behaviour patterns may be characterized by extreme restriction with respect to portion sizes, calories and food types (e.g., eliminating or severely limiting a particular macro-nutrient such as fat or carbohydrates). Flexibility is not tolerated and even a small deviation from one's stringent eating routines gives rise to feelings of inferiority. Often when people subscribe to such restrictive eating practices, small deviations can quickly spiral into full-blown binges (Shafran, Cooper, & Fairburn, 2002). Consistent with this reasoning, both clinical accounts and empirical studies have provided strong and consistent evidence for an association between perfectionism and eating disorder pathology (Bardone-Cone et al., 2007).

Need substitutes and compensatory behaviours often get intertwined in practice (path C in Figure 1). For instance, someone may rigidly stick to an extremely low-calorie diet (thereby engaging in a rigid behavioural pattern) with the aim of achieving the perfect body (thereby adopting a need substitute). In line with this idea, perfectionist strivings and the pursuit of the thin-ideal have been found to be interrelated (Boone, Soenens, & Braet, 2011). Also uncontrolled eating has been associated with perfectionist standards and self-critical functioning (Heatherton & Baumeister, 1991) as well as with sticking to an extreme and rigid diet (Herman & Polivy, 1980; Polivy & Herman, 1985).

Although both compensatory behaviours and the attainment of need substitutes may engender some derivative satisfaction, such feelings fail to provide long-term benefits for wellbeing and growth as they are unlikely to satisfy psychological needs (Kasser & Ryan, 2001; Van Hiel & Vansteenkiste, 2009; see reciprocal paths A and B in Figure 1). For instance, an anorectic person may derive a sense of competence from succeeding in extreme dietary restriction and weight loss goals. However, by adopting these rigid compensatory behaviours she diverts her attention away from

deeper causes of need thwarting and her condition may block the experience of genuine competence satisfaction in other life domains. Further, the rigid focus on eating behaviours might provoke internal conflict and stress and likely disrupts relationships as well as the attainment of more intrinsic life goals, thereby engendering social isolation and autonomy thwarting. In other words, the pursuit of need substitutes and engagement in compensatory behaviours interferes with genuine need satisfaction (Deci & Ryan, 2000; Ryan, et al., 2006), such that individuals get caught within an aggravating and negative cycle of need thwarting and eating pathology.

General self-determination. Until now we have described the effects of need thwarting on body image and disordered eating through the development of need substitutes and compensatory behavioural patterns. However, it is equally important to consider the benefits of need satisfaction – and not just the detriments of need thwarting. When basic needs are satisfied, people develop a more general self-determined orientation toward themselves and their social surroundings (see path D in Figure 1). General self-determination reflects the degree to which people function on the basis of their own interests, values and goals, whereas people who are less self-determined tend to be oriented more toward pressure and social expectations in their environment (Vansteenkiste, et al., 2010). General self-determination can function as a buffer against sociocultural pressures to be thin and adopting the thin-ideal, which constitute risk factors for body image concerns and disordered eating (Pelletier & Dion, 2007; Thompson & Stice, 2001; see paths E and F in Figure 1). Further, people who are more self-determined are also more likely to engage in activities or goals that reflect their own interests and values, which in turn creates more opportunities for need-satisfying experiences (see reciprocal path D in Figure 1).

Need Substitutes and Compensatory Behaviours: An Overview of Empirical Evidence

A growing number of studies support the role of need thwarting in the etiology of endorsing the thin ideal, body image concerns, and subsequent eating disorder-related symptoms. A first group of studies focused on the support and thwarting of the psychological needs within the family context as an antecedent to need satisfaction, rigid behaviour patterns and disordered eating (see paths A and B in Figure 1). For instance, Thøgerson-Ntoumani et al. (Thogerson-Ntoumani, Ntoumanis, & Nikitaras, 2009) found that parental need support was associated with greater experienced need satisfaction which, in turn, was predictive of fewer body image concerns and unhealthy weight behaviours, such as skipping meals and purging. Soenens and colleagues (Soenens, Vansteenkiste, et al., 2008) studied the associations between psychologically controlling parenting, perfectionism, and eating disorder outcomes in a nonclinical sample and a clinical sample of eating disorder patients. Psychologically controlling parenting involves the manipulation of the parent-child bond through the use of intrusive practices such as guilt-induction, shaming, and conditional regard (Barber, 1996). In the context of controlling parenting practices, children's basic psychological needs are likely to be thwarted, as parents force their children to comply with their agenda (autonomy-thwarting), as children feel unable to meet parents' expectations (competence-thwarting), and as the use of psychological control creates distance and coldness in the parent-child relationship (relatedness-thwarting; Soenens & Vansteenkiste, 2010). Soenens et al. (Soenens, Vansteenkiste, et al., 2008) showed that this need-thwarting parenting style was associated with more maladaptive perfectionism, which, in turn, predicted drive for thinness, body dissatisfaction and bulimic symptoms in both clinical and nonclinical samples. Further, the clinical sample reported experiencing more paternal psychological control relative to the non-clinical sample. In another study, Soenens and colleagues (Soenens, Luyckx, et al., 2008) demonstrated that

parental psychological control is not only associated with more rigid and self-critical functioning concurrently, but also predicts an increase in such functioning over time, which, in turn, predicts a rise in depressive symptomatology. Together, this body of work suggests that, as the result of being exposed to a critical, pressuring, and cold parenting climate, individuals may become increasingly self-critical, such that they rigidly stick to high standards for thinness and physical attractiveness. On the other hand, a need supportive parenting style is associated with more need satisfying experiences and fewer body image concerns and disturbed eating behaviours.

Some studies more directly examined the link between need satisfaction and need thwarting and disordered eating (path B in Figure 1). In a first study, it was found that adolescent athletes who experienced more psychological need thwarting during sport activities reported more eating disorder symptoms (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). Further, people who reported their psychological needs were not satisfied experienced a stronger urge to eat and more binge eating behaviours (Schueler & Kuster, 2011). These relations have not only been established at the interpersonal level, but also at the within-person, day-to-day, level. In a diary study, Verstuyf and colleagues (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013) found that daily fluctuations in psychological need thwarting are associated positively with daily fluctuations in binge eating symptoms, whereas daily fluctuations in psychological need satisfaction were associated positively with daily fluctuations in healthy eating behaviours. Finally, Thøgerson-Ntoumani and colleagues (2009) found evidence for a path model in which psychological need satisfaction was associated with less body dissatisfaction and drive for thinness, which, in turn was predictive of unhealthy weight behaviours, such as skipping meals and purging (see path C in Figure 1).

A third group of studies examined the association between one's general self-determined motivation and the endorsement of the thin-ideal as

well as eating regulation outcomes (paths E and F in Figure 1). Pelletier and colleagues (Pelletier & Dion, 2007; Pelletier, Dion, & Levesque, 2004) found that young women's general disposition to act in a self-determined way protects them against the adverse effects of sociocultural pressure to be thin and is negatively predictive of their tendency to endorse the thin-ideal. As a consequence, those who function in more self-determined ways were found to be less likely to engage in disordered eating behaviours (e.g., bulimic symptoms) and more likely to engage in healthy eating behaviours (e.g., amount of vegetables eaten). In a similar study, Kopp and Zimmer-Gembeck (2011) reported negative associations between general self-determination and perceived sociocultural pressures to be thin and adoption of the thin-ideal. In line with these studies, Mask and Blanchard (2011) found that women who are in general more self-determined, did not report body image concerns when exposed to a video portraying the female body as an object, whereas women low in general self-determined motivation reported more negative self-appraisals, body shame, and internally pressuring motives for eating when faced with such a body-objectifying situation.

Need Substitutes and Compensatory Behaviours: Clinical Implications and Future Research Directions

Although limited, studies within the context of eating regulation suggest that need thwarting is associated with (a) a stronger focus on appearance and body image and (b) more compensatory behaviours, such as uncontrolled eating and rigid functioning. In contrast, general self-determined motivation buffers against sociocultural pressures to be thin, personal endorsement of the thin-ideal and disordered eating behaviours.

Many issues remain to be addressed in future research, including the necessity to examine the role of need thwarting in the development of need substitutes, compensatory behaviours, and eating regulation problems over time. These variables might be reciprocally related to each other such that

the pursuit of need substitutes and the engagement in compensatory behavioural patterns predict need thwarting over time which, in turn, is predictive of an increasing focus on need substitutes and compensatory behavioural patterns. Another question that remains unaddressed is why some people indulge in rather uncontrolled eating behaviours when faced with need thwarting experiences, whereas others develop a more rigid and controlled coping strategy to such experiences. It would be interesting to investigate whether individuals' general tendencies toward self-determined functioning (e.g., causality orientations; Deci & Ryan, 1985), would help to clarify the circumstances under which these different behavioural responses are likely to emerge.

Although more research is needed, previous findings suggest that individuals' experienced degree of need satisfaction and need thwarting is involved in their eating behaviours. This implies that health-care providers can guide eating disordered patients to a healthier eating style by supporting their psychological needs. For instance, health care providers can help patients detect need-satisfying and need-thwarting sources in their life. For some, it might be useful to discuss need-thwarting experiences in their past, as a means to alleviate disruptions caused by these experiences. Also, learning effective coping tools to handle need thwarting experiences could prevent patients from engaging in maladaptive coping mechanisms, such as compensatory behaviours and pursuing need substitutes. Further, treatment contexts that are need-supportive in both one-on-one counseling experiences as well as at the level of the treatment facility can enhance clinical outcomes given the beneficial psychological milieu already demonstrated to result from need-supportive experiences in other contexts (Tantillo & Sanftner, 2010; Thogerson-Ntoumani, et al., 2009). Some empirical evidence already exists to support the importance of need satisfaction in clinical treatment of disordered eating. Creating a more need supportive context in a residential setting for patients with an eating disorder resulted in greater treatment engagement and less treatment dropout (Vandereycken & Vansteenkiste,

2009). Motivational interviewing can offer more insights into how to work with clients to become more self-determined in treatment (Vansteenkiste, Soenens, & Vandereycken, 2005). The emphasis on personal choice, empathy, and competence can contribute to a sense of need satisfaction, which, in turn, relates to a healthier and less disordered eating style.

The Role of Psychological Needs in the Optimal Regulation of Eating Behaviours

Optimal Regulation of Eating Behaviours: A Self-Determination Theory Perspective

In addition to playing a relatively *distal* role in the etiology of eating disordered behaviours and attitudes, processes of need satisfaction and need thwarting may also be more *proximally* involved in people's ongoing regulation of food intake and weight. The way eating behaviours are regulated and the experiences during the regulatory behaviours will depend on (a) individuals' motivational regulation of eating behaviour and (b) the goals underlying eating regulation (see paths A-D in Figure 2). Notably, the motivational basis for one's ongoing eating regulation may be very different for individuals who display a general self-determined motivation style compared to individuals who score high on need substitutes and compensatory behaviours (see path G and H in Figure 1). Thus, processes discussed in the previous section also are associated with one's motives and goals for the ongoing regulation of eating behaviours.

Regulation of eating behaviour. In its focus on motivational quality, SDT has conceptualized the types of motives underlying a variety of behaviours and endeavors, including one's eating regulation (Deci & Ryan, 2000). Early research on motivation focused on the distinction between behaviours that are intrinsically versus extrinsically motivated (Deci, 1972). Intrinsic motivation refers to undertaking an activity for its inherent interest and enjoyment, whereas extrinsic motivation refers to engaging in an activity to achieve an outcome separable from the activity. The concept of

intrinsically motivated behaviours is embedded within the view that people are inherently active organisms with a natural tendency toward growth and development, with intrinsic motivation being a manifestation of this growth-tendency. However, not all behaviours are inherently interesting or pleasurable. This might be the case particularly in the context of eating regulation, where perhaps few individuals restrict their food intake or adopt a different eating pattern because they find it inherently enjoyable to do so. Changing one's eating behaviours often involves some degree of physical and/or psychological discomfort and, although some individuals might develop an interest in their daily eating pattern or might perceive changing their eating behaviour as a positive challenge (Ryan & Deci, 2008; Teixeira, Patrick, & Mata, 2011), many individuals might not be intrinsically motivated to regulate many or most of their eating behaviours. Indeed, attempts to change eating patterns that are directed toward some separable outcome – whether that is to improve health, lose weight, or attain a more desirable physique – are by definition extrinsically motivated. However, there exists considerable variability in the extent to which the reasons underlying one's extrinsically motivated behavioural change are self-endorsed, that is, internalized within people's broader goals and values. Therefore, SDT has distinguished different types of extrinsic motivation that fall along a continuum of increasing autonomy and volition (Ryan & Deci, 2000). Behaviours that are more controlled are carried out with a sense of pressure and coercion whereas those that are more autonomously regulated are characterized by a sense of personal endorsement and internal consistency (Deci & Ryan, 2000; Patrick & Williams, 2006).

The most controlled form is *external regulation*, which refers to carrying out an activity to conform to other people's demands. The behaviour is oriented toward attaining positive outcomes, like others' approval or a promised reward, or to avoid negative outcomes, like criticism or threatening punishments. These types of outcomes can be explicit and clear, but they can also be implicit or subtle, and thus hard to identify, even

for the person/group in question. The second controlled form of regulation is *introjected* regulation whereby a behaviour is regulated based on internal pressure such as feelings of guilt, shame, or contingent self-worth (Deci & Ryan, 2000). For both external and introjected regulation, the behaviours are accompanied by feelings of pressure and obligation.

Identified and integrated regulation represent two relatively more autonomous forms of extrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2000). *Identified* regulation refers to carrying out a behaviour because one understands and values the importance of this behaviour. *Integrated* regulation involves not only valuing the behaviour but also bringing it in harmony with one's other goals and values. In both cases, one has the feeling of 'wanting' instead of 'having' to change one's eating behaviours.

This motivational continuum has been used to predict a range of outcomes, including performance, persistence, and psychological well-being, across several domains, including work (Gagne & Deci, 2005), education (Vansteenkiste, Lens, & Deci, 2006), sports and exercise (Fortier, Duda, Guerin, & Teixeira, 2012), psychotherapy (Ryan, Lynch, Vansteenkiste, & Deci, 2011), and health care (Patrick & Williams, 2012). More autonomously regulated behaviours have been found to engender a sense of vitality and energy and were found to relate to more need satisfying experiences within a given context. For instance, autonomous motives for work were associated with more need satisfying experiences at work, which, in turn, was associated with more vigor, job satisfaction, and better performance. In contrast, more controlled motives were associated with less need satisfying experiences which, in turn, predicted exhaustion and lower performance (Van den Broeck, et al., 2010). Similarly, in the context of eating regulation, more autonomous motives can elicit more need satisfying experiences during the process of eating regulation which, in turn, is associated with more energy and sustained healthy eating. In contrast, a controlled eating regulation would evoke more need thwarting experiences

during the process of eating regulation and therefore deplete one's energy and resources for successful eating regulation (see path C and F in Figure 2).

Goals underlying eating regulation. Consistent with the differentiation between intrinsic and extrinsic aspirations at the global level described above, people can pursue intrinsic or extrinsic goals when regulating their eating patterns. For example, someone can attempt to change his eating habits mainly to obtain a desirable physique (extrinsic goal) or mainly for the purposes of becoming healthier and more fit (intrinsic goal). Although in practice both goals might be present to some extent, the relative importance attached to these two types of goals yields a different relationship to eating behaviours. In the context of leisure-time physical activity, the more importance was attached to health relative to appearance, the more one experienced leisure-time physical activity as need satisfying which, in turn, was related to higher physical self-worth, higher well-being, and less exercise anxiety (Sebire, Standage, & Vansteenkiste, 2009). Similarly, an appearance-focused eating regulation is said to evoke more need thwarting experiences which, in turn, relates to more unhealthy and disturbed eating patterns (path D and F in Figure 2).

Optimal Regulation of Eating behaviours: An Overview of Empirical Evidence

To date, a handful of studies have examined the role of general motivational functioning in predicting motivation for eating regulation (paths G and H in Figure 1). Pelletier and Dion (2007) found that general self-determination was positively associated with more autonomous regulation for eating behaviours and negatively associated with more controlled eating regulation. Also, body dissatisfaction was associated with more controlled forms of eating regulation, whereas it had no association with more autonomous forms of eating regulation (Carraça et al., 2011; Kopp & Zimmer-Gembeck, 2011; Verstuyf, Vansteenkiste, & Soenens, 2012). Finally, when faced with events that trigger body dissatisfaction,

more self-determined women do not appear to develop introjected motives for eating regulation (Mask & Blanchard, unpublished manuscript). Motives and goals for eating regulation, in turn, influence how one regulates eating behaviours and the probability of succeeding or failing in one's dietary attempts (see Figure 2).

Motivational regulation of eating behaviour. Several studies have provided evidence for associations between the motives for eating behaviours and healthy or disordered eating behaviours. Pelletier and colleagues (Pelletier, Dion, Slovenic-D'Angelo, & Reid, 2004) found that autonomous eating regulation was associated with more healthy eating (e.g., eating more vegetables and fruits) and fewer bulimic symptoms. In contrast, controlled eating regulation was associated with less healthy eating and more bulimic symptoms. Interestingly, autonomous eating regulation was associated with being concerned with *what* one eats (i.e., quality of one's food), whereas controlled eating regulation was associated with being concerned with *how much* one eats (i.e., quantity of food; see also Pelletier & Dion, 2007). Further, autonomous eating regulation significantly predicted a reduction in percentage of calories from total and saturated fats over a 26-week period (Pelletier, Dion, Slovenic-D'Angelo, et al., 2004). In line with these findings, a study with participants in a commercial weight loss program found that an autonomous eating regulation related to eating more fruits and vegetables, whereas controlled eating regulation had no associations with eating behaviours (Wilson, Grattan, Mack, Blanchard, & Gilchrist, in press). Other research has examined the mechanisms through which autonomous and controlled eating regulations affect eating behaviours (see path A in Figure 2). These studies are interesting as they might provide more insight into why a preponderance of autonomous, relative to controlled, regulations is experienced as more need satisfying (see path E in Figure 2). For instance, Otis and Pelletier (2008) found that autonomous eating regulation was associated positively with approach food planning (i.e., planning to eat more healthy foods), whereas controlled eating

regulation was associated positively with avoidance food planning (i.e., avoiding too many calories, certain kinds of foods). Both approach and avoidance food planning were shown to be significant mediators of the associations between autonomous or controlled regulation and healthy eating behaviours, with approach food planning being positively predictive and avoidance food planning being negatively predictive of healthy eating behaviours (see path F in Figure 2). Further, it has been found that highly controlled, relative to highly autonomous, dieters display more extreme and rigid dieting behaviours across a 5-month period (Strong & Huon, 1999). In turn, flexible, relative to rigid, restrained eating has been shown to predict successful weight control, especially in the long-term (Teixeira et al., 2010). Finally, Hagger, Chatzisarantis and Harris (2006) found that autonomous motivation for dieting predicts a more positive attitude toward dieting and more perceived behavioural control over eating behaviours. Collectively then, this set of studies suggests that having an autonomous, relative to a controlled regulation of one's eating behaviour is associated with a different approach towards one's eating behaviour. This, in turn, may be associated with different experiences of need satisfaction or thwarting (see path E in Figure 2). For instance, an avoidance-orientation in goal pursuit has been found to predict less competence and autonomy (Elliot & Sheldon, 1998). These ideas await further empirical testing in the context of eating regulation.

A few studies have investigated the relative effects of autonomous and controlled motivation for changing one's eating behaviour, in the context of clinical weight loss treatment. For instance, Williams and colleagues (Williams, Grow, Freedman, Ryan, & Deci, 1996) found that being autonomously motivated to enter a weight management program was associated with greater program attendance and greater weight loss at the end of the intervention, in a sample of obese adults. Also, in a sample of overweight and obese women, autonomous treatment motivation was associated positively with improvements in eating self-efficacy and

cognitive restraint and was associated negatively with disinhibition, emotional, and external eating (Mata et al., 2009). Within the same trial, it was also observed that controlled regulation to enter obesity treatment was associated with poorer body image and lower psychological well-being (Carraça, et al., 2011) and that 1-year changes in weight loss treatment motivation predicted changes in psychological well-being in overweight women in the expected direction (Vieira et al., 2011). Also, intervention studies have found that experimentally increasing autonomous motivation for changing eating behaviours during treatment results in more weight loss compared to individuals in a control group for those who had a controlled motivation for dieting at baseline (Webber, Gabriele, Tate, & Dignan, 2010). This set of studies suggests that considering the motivational dynamics underlying eating behaviour change and promoting autonomous eating regulation are important for weight loss treatment.

Eating regulation goals. In addition to the motives for eating regulation, SDT maintains that it is critical to examine the goals underlying eating regulation, as different goals can elucidate different motivational dynamics. A first study demonstrated that dieting out of concern for one's appearance was associated with more drastic dieting strategies and with losing control over eating (Putterman & Linden, 2004; see path C in Figure 2). Another study demonstrated that both health-focused and appearance-focused weight loss goals in a group of overweight participants are associated with the number of diets, but that only appearance-focused weight loss goals were associated with the frequency of binge-eating episodes (Schelling, Munsch, Meyer, & Margraf, 2011). Two other studies demonstrated that the pursuit of a slender and physically attractive body through dieting was associated with more diet-specific need thwarting and unhealthy weight behaviours, while the pursuit of a healthy and fit lifestyle was associated with less diet-specific need thwarting and unhealthy weight behaviours (Thogerson-Ntoumani, et al., 2009; Verstuyf, et al., 2012; see path D and F in Figure 2).

Eating Regulation Motives and Goals: Clinical Implications and Future Research Directions

Together, previous studies suggest that it is important to consider the motivational basis for eating regulation as this is related to the success or failure of eating regulation with regard to weight loss and problematic eating behaviours. In line with SDT's basic tenets, autonomous versus controlled eating regulation, and the pursuit of health versus physical attractiveness, have been associated with more adaptive outcomes such as a more flexible approach to eating regulation, less diet-specific need thwarting, and more healthful and less disordered eating.

Future research is needed to more clearly elucidate the processes through which these motivational variables influence eating regulation. For instance, the association between the motives for eating regulation and experiences of need satisfaction or thwarting has not been addressed directly in previous research. Also, reciprocal relations between a rigid and avoidance-oriented approach to eating and need thwarting experiences during the regulatory process, still await empirical testing. Further, given the paucity of studies on intrinsic and extrinsic goals in the context of eating regulation, future research can investigate whether a focus on appearance versus health is associated with an increase in unhealthy or problematic eating behaviours over time and can shed light on the processes that can account for these differential associations. Finally, more research is needed to investigate how, across time, the motives and goals for eating regulation, diet-specific need thwarting, and eating behaviours affect each other in a reciprocal and mutually reinforcing fashion.

At the clinical level, the current research base suggests that health care providers could help patients evolve to a more healthy eating style by stimulating an optimal motivational quality for eating regulation. For instance, physicians and nutritionists could start from the patients' perspective rather than imposing a dietary plan. Patients can be informed about health risks associated with overweight, while health care providers

simultaneously keep an open view on the patients' perspective and their reasons to change and not to change. Further, research has shown that a need-supportive context enhances more autonomous forms of behavioural regulation (Mouratidis, 2011; Ryan, et al., 2011). Therefore, creating a need-supportive context at the organizational and therapeutic level, can also improve one's ongoing eating regulation. Motivational Interviewing (Miller & Rollnick, 2002) provides a practical set of intervention guidelines, skills, and strategies which are well-developed, field-tested, and are largely consistent with SDT premises on motivation and lasting behaviour change, including changes in diet (Vansteenkiste, et al., 2005).

SDT in Relation to Current Perspectives on Body Image Concerns and Eating Regulation

Although little research to date has examined motivational dynamics in eating regulation, many extant and intensively examined models of eating regulation have conceptual overlap with some of the basic tenets of SDT. In this section, we discuss SDT in relation to some of the prevailing perspectives on body image concerns and eating regulation, thereby focusing on how SDT-based constructs and processes may add to an understanding of the motivational dynamics in the context of eating and weight regulation. It is not our aim to exhaustively review and discuss the wide variety of models developed in the context of eating regulation (see Ogden, 2010, for an overview), but rather to selectively discuss those models where the motivational perspective of SDT can contribute to a more thorough understanding of how eating behaviour is self-regulated. Furthermore, because the models are mainly discussed in relation to SDT, they are only briefly summarized.

Thin-Ideal Internalization Model

Various scholars (e.g., Thompson & Stice, 2001) have emphasized the critical role of sociocultural influences in the adoption of the thin-ideal,

which represents a risk factor for the development of body dissatisfaction and disordered eating regulation. In much of Western society and other parts of the developed world, people (particularly women) are bombarded with images of thin and attractive models through advertisements and mass media (Dittmar, 2007). When exposed to such images, people feel pressured to adopt the thin-ideal as a personal goal. Cross-sectional, longitudinal, and experimental studies have provided evidence for this effect, demonstrating that individuals who experience sociocultural pressure to be thin are more likely to aspire to the thin-ideal and to experience body image concerns (Grabe, Ward, & Hyde, 2008; Stice, 2001).

Although SDT and the Thin-Ideal Internalization model use different terminology, there is considerable overlap between the concept of extrinsic goals within SDT, and more specifically physical appearance goals, and the concept of adoption of the thin-ideal. Pursuing the thin-ideal can be considered as a more extreme form of pursuing physical attractiveness, in which the norm for physical appearance is socially prescribed and more difficult to attain. Both SDT and the Thin-Ideal Internalization model acknowledge the flimsy promise that achieving attractiveness will result in increased well-being, control, and freedom (Engeln-Maddox, 2006; Evans, 2003; Ogden, 2010). SDT explains the fleetingness of this promise with its conceptualization of extrinsic goals, which may result in derivative satisfaction when the ideal is achieved but creates a very unstable form of well-being as it is unlikely that achieving the thin-ideal contributes to genuine need satisfaction.

Different from the thin-ideal internalization model, SDT also provides an alternative to this less-fulfilling extrinsic goal in the form of intrinsic goals and aspirations. From the perspective of SDT, people may pursue weight management and eating regulation in less functional ways – by striving for unattainable ideals propagated by images in popular media – or in more adaptive ways – by pursuing health and physical fitness. Because SDT provides this positive alternative in the form of intrinsic goals, it also

incorporates more positive indicators of well-being (e.g., positive affect, vitality; Kasser & Ryan, 1996). This is in contrast to traditional perspectives such as the thin-ideal internalization model that typically focuses on body dissatisfaction and disordered forms of eating as outcomes (e.g., Stice, 2001).

Another similarity between the thin-ideal internalization model and SDT is that both emphasize the critical role of the social environment in the adoption of the thin-ideal. When individuals are repeatedly exposed to images and messages that the pursuit of the 'perfect body' yields happiness, they may model their own behaviour and aspirations accordingly. One intriguing question is whether some individuals are more susceptible to the experience of sociocultural pressure and to the subsequent pursuit of the thin-ideal compared to others. SDT's perspective on need satisfaction and need thwarting may offer some insights in this regard. When people's basic needs have been chronically thwarted, they might feel more insecure which, in turn, may lead them to pursue need substitutes in an attempt to compensate for thwarted needs. One possibility is that when individuals experience need-thwarting, they may seek out distractions in the form of television, fashion magazines, and other forms of media that expose them to advertisements promoting the thin-ideal (Williams, et al., 1996). This increased exposure to sociocultural norms for thinness may make them more susceptible to these messages. An alternative possibility is that both need-thwarted and need-satisfied individuals are equally exposed to such media, but that need-thwarted individuals interpret the message as more pressuring and controlling. A third possibility is that need-thwarted and need-satisfied individuals interpret the same ads as equally pressuring, but that need-satisfied individuals cope differently with these pressures. Need-satisfied individuals might more easily question the message spread by the mass media and may reflect on whether the pursuit of thinness fits with their own preferences and goals. In contrast, need-thwarted individuals might more readily accept the "truth" of these messages and, as a result, endorse the thin-

ideal more strongly. Some research to date has found that women who are in general more self-determined experience less sociocultural pressures, adopt the thin-ideal less strongly and even react differently to equally pressuring images (Mask & Blanchard, 2011; Pelletier, Dion, & Levesque, 2004). Future research is needed to better clarify the role of need satisfaction in susceptibility to and endorsement of the thin-ideal.

Importantly, the adoption of cultural messages such as the thin-ideal might also interfere with the potential to experience subsequent need satisfaction (Verstuyf, et al., 2012). The pursuit of physical attractiveness and the thin-ideal in particular promote an outward orientation, such that individuals hinge their self-worth and value upon achieving this ideal. This kind of goal pursuit creates intrapersonal pressure (reduced autonomy) and may lead these individuals to engage in stressful and potentially socially-alienating social comparisons (lack of relatedness). Failure to achieve the unattainable goals set up by social norms and pursuit of the thin-ideal often results in feelings of inferiority stemming from an inability to reach one's goals (lack of competence). More research is needed to identify how need satisfaction and thwarting function as both antecedents to and consequences of adoption of the thin-ideal. Future research incorporating elements of both SDT and the thin-ideal internalization model is important for further clarifying the potential overlap of and distinction between these two perspectives as they relate to body satisfaction and eating regulation.

Self-Objectification Theory

Another model that elaborates on the role of sociocultural influences in body image concerns and eating disorders is *Self-Objectification Theory* (Frederickson & Roberts, 1997). Within this theory, girls and women are said to measure their self-worth by evaluating their physical appearance against the sexually objectifying and often unrealistic standards of beauty that prevail in Western society. Western culture is said to socialize girls and women in such a way that they take a third-person or observer perspective

toward their own body, which makes them preoccupied with their appearance and leads them to objectify their own body. Consistent with the theory, several studies have shown that trait self-objectification is associated with depression, body shame, and bulimic and restrictive eating disorders (Frederickson & Roberts, 1997; Miner-Rubino, Twenge, & Fredrickson, 2002). In addition to these more stable interpersonal differences in self-objectification, certain situations (e.g. trying on a swimsuit) can trigger self-objectification. Such primed self-objectification yields an array of negative consequences, including body shame, restrained eating (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998), and impaired performance (Quinn, Kallen, Twenge, & Frederickson, 2006).

Although self-objectification theory is embedded within a feminist perspective and SDT stems from motivational psychology, there are some interesting conceptual similarities that are worth noting. For instance, both theories state that a preoccupation with physical appearance will have negative effects for people's general (e.g., depression) and domain-specific (e.g., body shame, unhealthy weight behaviours) functioning. Notably, in both frameworks, the relative importance of physical appearance compared to other goals is emphasized. The measurement of trait self-objectification (Quinn, et al., 2006) requires individuals to rank order a set of 12 body attributes, half of which reflect a preoccupation with physical appearance and half of which reflect a focus on physical competence, such as health, energy level, and physical fitness. Similarly, studies within the context of exercise of eating regulation that investigated one's goal orientation, often compared the relative importance attached to health versus appearance (Sebire, et al., 2009; Verstuyf, et al., 2012).

Additionally, both frameworks emphasize the adverse role of objectification. Within SDT, the concept of objectification has been proposed as a mediating mechanism between one's goal orientation and need satisfaction (Kasser & Kanner, 2004; Vansteenkiste, et al., 2008). Specifically, the adoption of an objectifying stance toward others is

characterized as dehumanizing (Haslam, 2006) because it reduces others to objects. The target of this objectification process might be different depending on the specific nature of the extrinsic goal, with others being objectified if someone strongly values materialism, power, or fame and with one's own body being objectified if someone strongly values physical appearance and slenderness (Vansteenkiste, et al., 2008). At a broader level, the adoption of an objectifying stance reflects a conditional approach to others' or one's own body. An example from another domain may serve to illustrate this point. People who strongly value money and power may appreciate others only to the extent that they can help them in achieving their extrinsic ideals. Similarly, people who strongly pursue physical attractiveness may appreciate and value their body only when they meet the expectations of being attractive, but feel ashamed of their body and disappointed in themselves when they fail to meet this objective.

(Self-) objectification also precludes a full investment in the regulatory activity at hand. Consistent with the experimental work within Self-Objectification Theory (Quinn, et al., 2006), Plant and Ryan (1985) demonstrated that dispositional and experimentally induced public self-consciousness, which reflects individuals' tendency to be aware of themselves as objects of others' observation, yielded deleterious effects on individuals' enjoyment of the activity. More recently, the framing of an activity to achieve an extrinsic goal, relative to an intrinsic goal, has been found to disrupt conceptual learning, because extrinsic goals put pressure on individuals and forego a task-involved approach of the learning activity (Vansteenkiste, et al., 2006). A similar explanation has been provided within Self-Objectification Theory: the negative effects associated with the induction of state self-objectification are said to result from the constant monitoring of one's body which is said to interfere with full absorption in other activities (e.g., work; Frederickson & Roberts, 1997). From the SDT perspective, continual distraction from the activity will likely undermine the satisfaction of one's basic psychological needs for autonomy, competence,

and relatedness, such that the energetic resources needed for the ongoing eating regulation are more easily eroded.

Despite these similarities, there are also some differences between the SDT framework and self-objectification theory. First, whereas self-objectification theory explicitly focuses on self-objectification in the context of appearance, SDT considers pursuing physical attractiveness as one type of extrinsic goal that has adverse effects on people's functioning and well-being. Further, SDT explains the harmful effects of objectification in terms of its association with basic psychological need satisfaction. Nevertheless, and in light of the correspondence between self-objectification theory and SDT, it would be interesting for future research to directly examine whether self-objectification could play an explanatory role in the relationship between goals and diet-specific need thwarting and maladaptive eating behaviours.

Dietary Restraint Theory

Advertisements and the media strongly emphasize the idea that the 'thin-ideal' can be achieved by dieting (Ogden, 2010). Given the positive meaning attached to the thin-ideal, it is not surprising that the dieting industry has boomed (Ogden, 2010) and that the majority of adolescent girls (Gusella, Goodwin, & van Roosmalen, 2008) and adult women (Jeffrey & French, 1996) indicate they have dieted or are currently dieting to lose weight. Unfortunately, it is uncertain whether dieting has the expected positive effects on individuals' weight and body size. This is because many people who start dieting fail to control their food intake adequately (Field et al., 2003). For instance, several diet programs have been unsuccessful in promoting long-term weight loss (Wadden & Phelan, 2002; Wing, Tate, Gorin, Raynor, & Fava, 2006). According to Dietary Restraint Theory (Polivy & Herman, 1985), dieting can even be a causal factor contributing to overeating and bulimic symptoms. Much research attention has been devoted to this issue but results are mixed and it remains unclear whether dietary

restraint should be recommended or discouraged to improve body image and regulation of eating behaviours (Groesz & Stice, 2007). SDT may provide some useful insight into when and why dieting is more likely to fail.

According to the Dietary Restraint Theory (Polivy & Herman, 1985), dietary restraint can have adverse effects on food intake and result in overeating. Heightened attention to food intake can create a cognitive boundary, which replaces a more intuitive regulation of food intake. This overly-cognitive focus reduces people's sensitivity toward physiological signs of satiety and hunger and instead creates a preoccupation with psychological, cultural, or social signs to eat (Herman & Polivy, 1980). In line with this claim, experimental research (Herman & Mack, 1975) showed that individuals high in dietary restraint were more likely to indulge in overeating after having violated their cognitive rules about food intake (e.g., after eating a small amount of high caloric food). The process whereby dieters lose control over their food intake is known as the "disinhibition effect" (Herman & Mack, 1975). The dietary restraint hypothesis has been incorporated within the Dual Pathway Theory (Stice, 2001) as one of the pathways toward the development of bulimic symptoms, particularly bingeing.

Although the Dietary Restraint Theory does not explicitly focus on motivational dynamics underlying dieting efforts, some processes that have been proposed to understand the disinihibition effect can be linked to one's motivation for eating regulation in our view. For instance, some dieters display a shift in cognitions, vacillating from restrictive restraint to giving in to their urge to eat or even actively rebelling against self-imposed dieting rules (Herman & Polivy, 1980; Ogden & Wardle, 1991). Research within SDT has shown that a breakdown in one's self-regulatory activities and rebellious actions against (self)-imposed rules are more likely to result from a controlled, rather than autonomous, regulation (Ryan, et al., 2006). Second, we suggest that the all-or-nothing approach to dieting ('once I break a diet rule, the entire process becomes worthless') described in dietary restraint

theory as the abstinence-violation effect (Ogden & Wardle, 1990) can be linked to a controlled regulation of one's behaviours hinging one's self-worth on a regulatory activity or goal (i.e. introjected regulation). Third, the rebound-effect (Wegner, 1994), which is the increase in thoughts about eating (Soetens & Braet, 2006) and eventually actual eating (Erskine, 2008) after having suppressed thoughts about 'forbidden' foods, is most likely to occur in dieters with a controlled regulation for dieting. That is, dieters with a controlled motivation for eating are more likely to use avoidance strategies (e.g., avoiding foods that are high in fat) to change their eating behaviours (Otis & Pelletier, 2008). Dieters with a more autonomous eating regulation will more often use approach goals such as eating more healthy foods.

In sum, although Dietary Restraint Theory maintains that dietary restraint can result in a disinhibited eating style, research has shown this it is not necessarily the case. Although motivational dynamics are not explicitly discussed in this model, the processes that are found in dietary break-down are more closely connected to a controlled pattern of eating regulation. Future research could more explicitly investigate motivational dynamics underlying dietary restraint and investigate whether the differentiation between several types of motivation (goals and regulatory styles) can promote more insight into when and why dietary restraint is likely to fail.

Self-Control Theory

Self-Control Theory (Baumeister & Heatherton, 1996) hypothesizes that eating regulation will fail over time. Based on their self-regulation or self-control model, Baumeister and Heatherton (Baumeister & Heatherton, 1996) argued that people's self-control capacity is a limited resource or strength that gets depleted over time (i.e. ego-depletion). Self-control is defined as "the use of cognitive and attentional resources to override, inhibit, or alter impulses in the service of attaining personal goals or satisfying motives" (Vohs & Heatherton, 2000, p. 94). According to self-control theory, self-control is a limited resource that can be used up, although there

is individual variation in people's resources available for self-control. From the self-control perspective, eating regulation can be considered as one form of behavioural control (Vohs & Heatherton, 2000). Behaviour control is seen as psychologically demanding and, hence, will use up people's self-regulation resources. This implies that dieters would be successful in regulating their eating pattern as long as they have sufficient resources available for self-control. However, resources for eating regulation would become depleted when people need to regulate for longer periods of time or when situational demands challenge their self-regulation efforts. Consistent with this reasoning, research has shown that dieters ate more high caloric food when they had already consumed their self-regulatory resources on a previous (even unrelated) task (Vohs & Heatherton, 2000; Ward & Mann, 2000).

SDT concurs with self-control theory that eating regulation can involve effort and be both psychologically and physically draining. Although for some people changing eating behaviours is perceived as an intrinsically motivated challenge, for most it is probably an extrinsically motivated behaviour in the service of attaining a separable goal (e.g., losing weight, becoming more attractive, increasing fitness, or feeling better). An important difference between both frameworks is that, according to SDT, the ego-depleting character of eating regulation will depend on the motivational basis for eating regulation. Because of the differential relationship with the three needs, a controlled and appearance-focused eating regulation is more likely to be ego-depleting (Moller, Deci, & Ryan, 2006; Muraven, Gagné, & Rosman, 2008). In contrast, autonomous and health-focused eating regulation is less likely to be resource-depleting, and the fulfillment of psychological needs is likely to be resource-restorative. Indeed, research has demonstrated a positive link between autonomous self-regulation and subjective vitality (i.e. experiencing psychological energy). For instance, severely obese patients who entered treatment with a more autonomous motivation for behaviour change reported higher levels of subjective vitality

at the 2-year follow-up (Ryan & Frederick, 1997; Study 5). Also, persistence in ego-depleting activities, such as elite swimming, is higher amongst autonomously motivated individuals (Pelletier, Fortier, Vallerand, & Brière, 2001). Further, experimental studies have shown that individuals being placed in a controlling, relative to those being placed in an autonomy-supportive environment, experience greater ego-depletion after exerting initial self-control (Muraven, et al., 2008). Similarly, Moller et al. (2006) found that making choices yielded an ego-depleting effect when the individual felt pressured to choose a certain option, but found that the ego-depleting effect was absent in an autonomous choice condition in which participants freely choose their desired option. Moreover, these experiments indicated the effect of an autonomous versus controlled regulation on subsequent self-control in unrelated tasks was mediated by feelings of vitality (Muraven, et al., 2008, Study 3; Moller, et al., 2006, Study 3).

Together, these studies demonstrate that the ego-depleting effects of self-control depend on the underlying motives for exerting self-control. Less research has been conducted regarding the role of underlying goals in self-regulation. One study found that appearance-focused, relative to health-focused, eating regulation was associated with more diet-specific need thwarting, which in turn predicted more bulimic symptoms (Verstuyf, et al., 2012). Also, appearance-focused exercising predicted more exercise-specific need thwarting and, in turn, was related to less perseverance of the exercise behaviours (Sebire, et al., 2009). More research is needed to investigate whether the ego-depleting effects of eating regulation is dependent upon the motivational basis for eating regulation and, to investigate whether diet-specific need thwarting can explain why eating regulation is energy-draining. Further, although research demonstrated the differential effects of underlying motives for regulation on ego-depletion, future research needs to examine more directly the impact of goals underlying self-regulation on ego-depletion.

Conclusion

Eating regulation encompasses a wide variety of behaviours that have been intensively studied over the past 30 years. Although specific processes are involved in different manifestations of eating regulation (e.g., weight management, purging, restraint), we argue that motivational dynamics represent a common factor underlying the range of eating behaviours. Specifically, SDT may be of added value to the eating regulation literature for two reasons. First, the concept of basic psychological needs, as conceived within SDT, can help to bridge different parts of the literature on eating regulation. This is because the satisfaction and thwarting of one's basic psychological needs for autonomy, competence, and relatedness represent key mechanisms to understand how disordered eating develops and how people manage or fail to optimally regulate their ongoing eating patterns. While many theories and models in the eating regulation literature have addressed either disordered eating or ongoing eating regulation, the concept of psychological needs represents a promising process to simultaneously address both issues.

Second, what is critical from the SDT perspective is to move beyond considering individuals' level or degree of eating regulation and instead adopt a more differentiated approach. This is achieved by distinguishing different types of motives (i.e., autonomous and controlled) and different goals (i.e., intrinsic and extrinsic) for eating regulation which have been found to yield distinct eating outcomes, in part because they allow for varying degrees of need satisfaction. We hope that this review encourages scholars in the field of eating regulation to devote greater attention to the motivational dynamics in eating regulation and to examine the overlapping and unique aspects of SDT in relation to existing frameworks in this field.

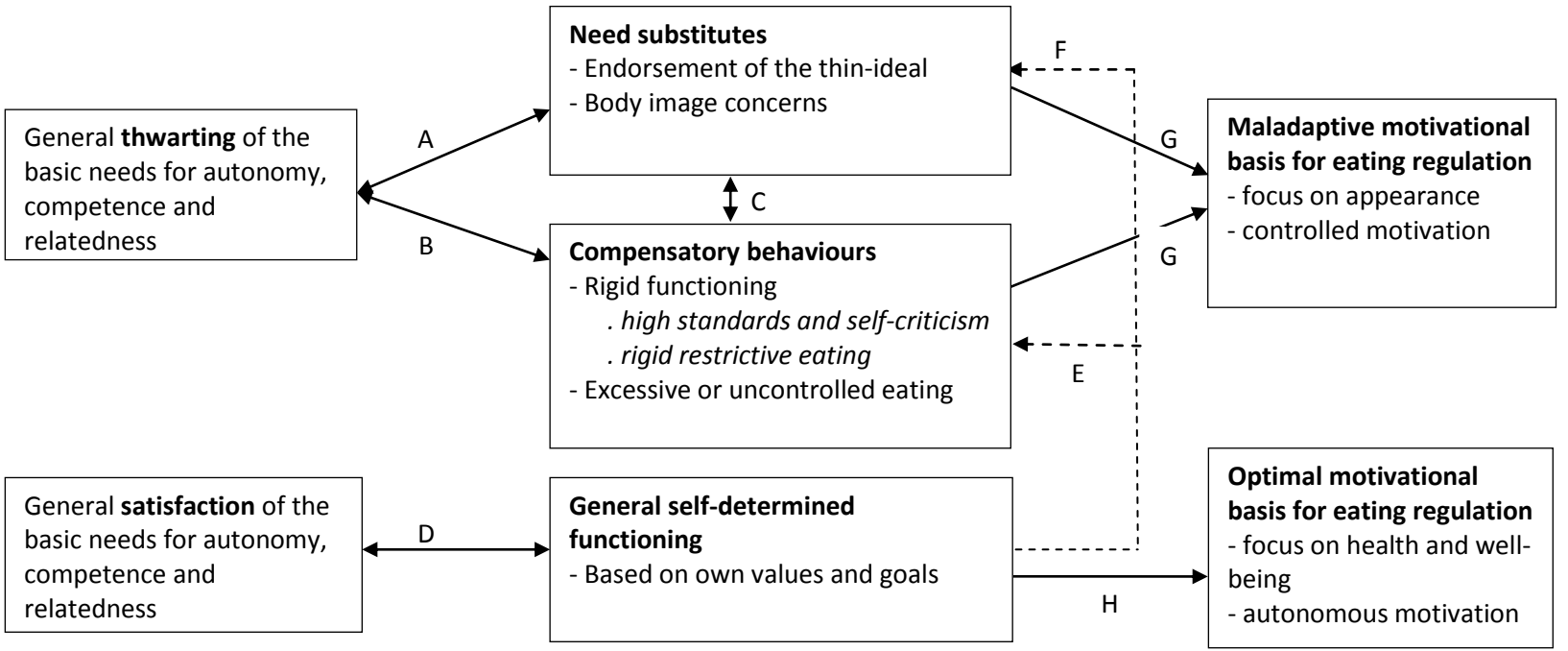

*Figure 1.*The role of basic psychological need satisfaction versus thwarting in the etiology of disordered eating

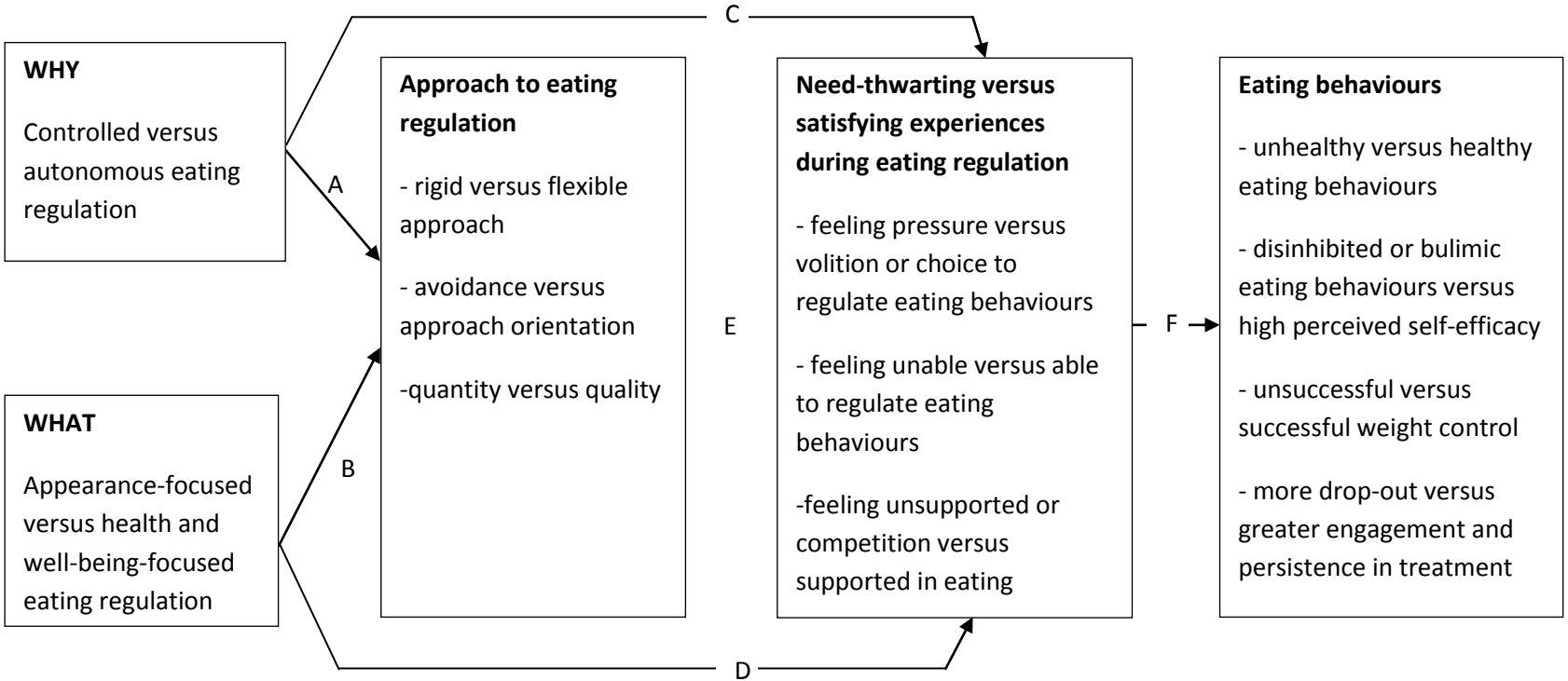

Figure 2. The role of basic psychological need satisfaction versus thwarting in the ongoing regulation of eating behaviours

Chapter 3

Eating Regulation and Binge Eating Symptoms: The Differential Correlates of Health-Focused and Appearance-Focused Eating Regulation[1]

Based on Self-Determination Theory, this study aimed to gain further insight in the pathway from eating regulation to binge eating symptoms by (a) examining diet-specific need frustration as an intervening mechanism, (b) investigating the associations between different types of goals underlying eating regulation and diet-specific need frustration and binge eating symptoms, and (c) considering body dissatisfaction as an antecedent of eating regulation and eating regulation goals. In a sample of 244 female adolescents, SEM analyses showed that (a) the association between eating regulation and binge eating symptoms can be accounted for by need frustration, (b) appearance-focused and health-focused eating regulation are associated differentially with need frustration and binge eating symptoms, and (c) body dissatisfaction is related positively to eating regulation and appearance-focused eating regulation. These findings suggest that the goals underlying one's eating regulation and the concept of need frustration help to understand when and why eating regulation is associated with binge eating symptoms.

[1] Slightly Adjusted: Verstuyf, J., Vansteenkiste, M., & Soenens, B. (2012). Eating regulation and bulimic symptoms: The differential correlates of health-focused and appearance-focused eating regulation. *Body Image, 9,* 108-117.

Introduction

In contemporary Western society, there is a strong focus on body appearance and eating regulation. Many girls and women are dissatisfied with their body and engage in dietary behaviours to lose weight (e.g., Striegel-Moore et al., 2009). At the same time, prevalence rates of overweight and obesity have increased strongly (Ogden, Yanovski, Carroll, & Flegal, 2007). Because of these trends, eating regulation has become part of our cultural identity (Bacon, Stern, Van Loan, & Keim, 2005).

Unfortunately, research has shown that most people who regulate their food intake fail to do so effectively in spite of their well-meant intentions (e.g., Heatherton, Herman, Polivy, King, & McGree, 1988). The Dietary Restraint Model (Polivy & Herman, 1985) and the Dual-Pathway Model (Stice, 2001) even state that restraining one's food intake through dieting represents a pathway towards the development of disordered eating symptoms. Past research has, however, produced mixed evidence for this claim, with some studies suggesting a positive association between eating regulation and binge eating symptoms (e.g., Ouwens, van Strien, van Leeuwe, & van der Staak, 2009) and others finding no association (e.g., Cooley & Toray, 2001) or even a negative association (e.g., Groesz & Stice, 2007). Further, this research mainly focused on body dissatisfaction as a motive for eating regulation and less attention has been given to other motivational forces that can contribute to or undermine successful eating regulation. Drawing upon Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), a well-validated theory of motivation, we examined whether the type of goals (i.e., physical appeal vs. health and fitness; Kasser & Ryan, 1996; Vansteenkiste, Soenens, & Duriez, 2008) adolescent girls aim to achieve when regulating their food intake is related to binge eating symptoms. In addition, we examined whether the frustration of one's basic psychological needs can account for the associations of eating regulation per se and the goals underlying one's eating regulation with binge eating symptoms.

Dietary Restraint and Binge Eating Symptoms

In a society where the dieting industry was booming, Herman and Polivy (1980) advanced the controversial hypothesis that dietary restraint may have adverse effects on food intake. When body dissatisfied people start dieting to change their body shape and weight, a cognitive boundary would replace the more physiological regulation of food intake. This cognitive focus would reduce people's sensitivity toward physiological signs of satiety and hunger and instead increase a preoccupation with psychological, cultural, or social signs to eat. In line with this claim, experimental research (e.g., Herman & Mack, 1975) showed that individuals high in dietary restraint are more likely to indulge in overeating after having violated their cognitive rules about food intake (e.g., after eating a small amount of high caloric food). The process where dieters lose control over their food intake came to be known as the disinhibition effect (Herman & Mack, 1975). Later, the dietary restraint hypothesis was incorporated within the Dual Pathway Theory (Stice, 2001) as one of the pathways toward the development of binge eating symptoms.

Although the dietary restraint hypothesis stimulated abundant research on the pathway from restraint to binge eating symptoms, the results from this body of work are rather inconsistent. Findings seemed to depend on several factors, including study design (Stice, Fisher, & Lowe, 2004) and the way restraint is assessed (Van Strien, 1999). For instance, although prospective studies showed that self-reported restraint predicted increases in overeating (e.g., Ouwens et al., 2009; Stice, 2001), experimental research showed that imposing a low-calorie diet on participants results in lower (instead of higher) levels of overeating and binge eating symptoms (e.g., Burton & Stice, 2006; Groesz & Stice, 2007). Also, studies that used self-report measures of dietary restraint yielded different results depending upon the scale that was used to measure dietary restraint (e.g., Stunkard & Messick, 1985; Van Strien, Frijters, Bergers, & Defares, 1986). From these studies we can conclude that although dietary restraint can be a risk factor

for binge eating symptoms, this association does not always hold (e.g., Van Strien, 1999). However, it is not clear exactly which factor differentiates between successful versus unsuccessful eating regulation.

In this respect, we believe that introducing a motivational perspective to eating regulation can help clarify when and why eating regulation will be more or less likely to fail. To date, little attention has been given to the goals underlying individuals' eating regulation attempts. In fact, most researchers seem to assume that individuals who regulate their eating behaviours are driven by body dissatisfaction and aim to alter their physical appearance. However, another type of eating regulation might occur in which one does not necessarily restrain food intake to become more attractive but rather regulates eating behaviours to have a good health. In this study we draw upon the motivational perspective of SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), to examine whether appearance-focused and health-focused eating regulation yield differential associations with diet-specific need frustration and binge eating symptoms.

Self-Determination Theory: Not All Eating Regulation Goals are Equally Frustrating

Within SDT, three basic psychological needs are distinguished: the needs for autonomy (i.e., experiencing a sense of volition and psychological freedom), competence (i.e., experiencing a sense of effectiveness), and relatedness (i.e., feeling cared for by others). If these needs are satisfied, people feel energized and vital to take on new activities, whereas need frustration would engender less effective functioning, as indexed by ill-being and passivity (Deci & Ryan, 2000). Research has shown that satisfaction of these three needs is associated with general well-being and vitality (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000) as well as with adjustment in more specific behavioural contexts, such as health, education, work, sports and exercise (Vansteenkiste, Niemiec, & Soenens, 2010). For instance, elite female athletes reported feeling more energetic and vital after practice on

days their basic needs had been satisfied during the practice, even though the practice had been physically demanding and calorie-draining (Gagné, Ryan, & Bargmann, 2003). Also, Sebire, Standage and Vansteenkiste (2009) found in a group of adults that more need satisfaction while exercising predicted more physical self-worth, exercise behaviours, and wellbeing.

In this study, we aimed to examine associations between eating regulation, binge eating symptoms, and need frustration rather than need satisfaction. Recent evidence suggests that a lack of need satisfaction is not the same as need frustration (Sheldon, Abad & Hinsch, 2011). For instance, low satisfaction of the need for autonomy does not automatically imply that people experience a sense of pressure. Similarly, low satisfaction of the needs for competence and relatedness is distinct from feeling like a failure (i.e., competence frustration) and feeling disrespected and rejected by other people (i.e., relatedness frustration). Research shows that experiences of need satisfaction and experiences of need frustration do not represent perfect opposites. Further, it has been shown that whereas need satisfaction is more strongly predictive of psychosocial adjustment and well-being, need frustration is more strongly related to maladjustment and psychopathology (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). Because the main outcome variable in this study was binge eating symptoms, we decided to focus on need frustration rather than need satisfaction.

In line with extant SDT-based research on need satisfaction, we expect that need frustration during the eating regulation process (i.e., diet-specific need frustration) will be associated with more binge eating symptoms. Also, we reasoned that the association between eating regulation and binge eating symptoms, if any, might be accounted for by need frustration. Eating regulation has been described as a rather challenging type of behaviour (Baumeister & Heatherton, 1996) that, on average, may result in need frustrating experiences. For instance, because eating regulation may involve that people change old eating habits or try to inhibit social cues to eat, eating regulation may come with feelings of social tension and pressure

to adhere to one's eating regulation standards (i.e., relatedness and autonomy frustration). Also, inevitably attempts to regulate one's eating pattern sometimes will fail, thus giving rise to feelings of incompetence and failure (i.e., competence frustration).

A second aim of this study was to examine whether the goals people pursue during the process of eating regulation matters in predicting diet-specific need frustration and subsequent binge eating symptoms. According to SDT, one important influence on processes of need satisfaction is the types of goals people pursue (Ryan, Sheldon, Kasser, & Deci, 1996). Kasser and Ryan (1996) distinguished between intrinsic goals, such as affiliation, community contribution, and health, and extrinsic goals, such as wealth, image, and physical appearance. Extrinsic goals are very salient in a consumer culture, where fame, money, and good looks are often portrayed as signs of success (Vansteenkiste et al., 2008). The appeal of these goals lies in the anticipated power, social approval, or sense of worth that would result from attaining them (Kasser, Ryan, Couchman, & Sheldon, 2004). Therefore, it has been argued that individuals with a focus on extrinsic goals tend to be more oriented towards interpersonal comparison, contingent approval, and garnering of external signs of worth (Kasser et al., 2004; for an overview see Vansteenkiste et al., 2008). In contrast, the pursuit and attainment of intrinsic goals is said to be more inherently satisfying as intrinsic goals have a focus on the development of one's own interests and values (Sheldon & Kasser, 2001). As a consequence, the pursuit of intrinsic, relative to extrinsic, goals is more likely to result in experiences that can satisfy people's basic psychological needs (Vansteenkiste et al., 2008).

Whereas intrinsic goals would engender basic need satisfaction, the pursuit of extrinsic goals would frustrate these needs. In line with this hypothesis, intrinsic, relative to extrinsic, goal pursuit was found to be positively associated with need satisfaction in domains such as work (Vansteenkiste et al., 2007) and exercise (Sebire et al., 2009). Building on this research, the current study aimed to examine whether extrinsic (i.e.,

becoming more physically attractive) and intrinsic (i.e., become more healthy and fit) eating regulation goals are associated differentially with diet-specific need frustration and binge eating symptoms. We hypothesized that appearance-focused, and not health-focused, eating regulation would be associated with more diet-specific need frustration, which in turn, would relate positively to binge eating symptoms. Some recent research provides support for several parts of this hypothesized sequence of events. First, a number of studies examined associations between goal pursuit and eating disorder symptoms. Putterman and Linden (2004), for instance, found that dieters who were motivated to change their appearance through dieting were more likely to use drastic dieting strategies and to score higher on disinhibited eating compared to dieters who were dieting out of health concerns. de Souza, Mussap, and Cummins (2010) found that engagement with the goal of altering appearance was related to more problematic weight control behaviours. Second, other studies have addressed associations between need satisfaction and eating disorder symptoms. Schüler and Kuster (2011), for instance, showed that unfulfilled basic needs are associated with more binge eating symptoms in a group of adults. Third, studies have examined associations between goal pursuit and processes of need satisfaction. Thogerson-Ntoumani, Ntoumanis, and Nikitaras (2010) showed that the general importance attached to health was positively associated with global need satisfaction in adolescent girls, whereas importance attached to image was unrelated to need satisfaction. Although several parts of the mediation sequence developed here have been tested before, this study is the first to test the full sequence of events. Specifically, this study is the first to examine whether the type of goals people have in mind while regulating their food intake is related to binge eating symptoms through its association with diet-specific need frustration.

The Present Research

The current research aimed to gain further insight in the pathway from eating regulation to binge eating symptoms by adopting a motivational perspective, that is, by considering the goals underlying one's eating regulation. It is important to note that, in this study, we define and measure eating regulation somewhat more broadly than is the case in many studies on dietary restraint. We reasoned that, by measuring 'dietary restraint' only, there would be relatively little variance in individuals' goals for eating regulation because dietary restraint, with its focus on decreasing intake of food and calories, would be primarily driven by an appearance –focus rather than by a health-focus. This confound of dietary restraint with an appearance focus is particularly likely to occur in normal-weight youngsters, who have little other reason to go on a diet but to look more attractive. Accordingly, we chose to assess eating regulation more broadly as all efforts to regulate one's eating behaviours. In doing so, we used a brief and face-valid, yet relatively rarely used, measure of eating regulation developed by Pelletier and colleagues (Pelletier, Dion & Lévesque, 2004) rather than a more frequently used measure of dietary restraint. Because the current measure contains items like "To what extent are you trying to regulate your eating behaviour", participants who aim to reduce their food intake or eat more healthily might both endorse this item. This is in contrast with the available restraint measures, which only tap into the restriction of food intake. Moreover, at least some of the restraint questionnaires, such as the Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986) seem to represent a mixture of eating regulation and an appearance focus (e.g., 'How often do you try to eat nothing between meals because you think about your shape?'). Because the latter type of measure does not allow one to disentangle the effects of eating regulation per se and the goals behind eating regulation, it was deemed important to use a broader and goal-neutral measure of eating regulation.

Using such a measure of eating regulation, we pursued three aims. We began by examining the association between intensity of eating regulation and binge eating symptoms. Given that a stronger concern with eating regulation might be associated with more feelings of diet-specific need frustration, we expected intensity of eating regulation to be associated with more binge eating symptoms.

The second aim of this study was to examine whether the type of goals one pursues while regulating eating behaviours plays a role in understanding when eating regulation yields maladaptive correlates beyond intensity of eating regulation per se. Based on SDT, we expected appearance-focused eating regulation to be positively related to diet-specific need frustration, whereas health-focused eating regulation would be negatively related to diet-specific need frustration, which in turn would be associated with more binge eating symptoms. An additional aim was to examine whether intensity of eating regulation would yield a unique relation to diet-specific need frustration and binge eating symptoms after taking into account eating regulation goals.

Finally, consistent with previous models of dietary restraint and binge eating (Stice, 2001), we examined the role of body dissatisfaction as a motivating force behind one's efforts to regulate one's food intake. Further, the assessment of eating regulation goals opened the possibility to examine whether body dissatisfaction would be related to *any kind* of eating regulation goals or rather relate to a *specific* type of eating regulation goals. Because body dissatisfaction is more likely to involve appearance than health concerns, we expected that body dissatisfaction would be more strongly related to appearance-focused than to health-focused eating regulation. Finally, we examined whether the association between body dissatisfaction and binge eating symptoms (Stice, 2002) could be accounted for by intensity of eating regulation, the goals behind eating regulation, and diet-specific need frustration.

Method

Participants and Procedure

Three hundred Belgian teenage girls, following an academic (53%) or technical track at school (47%), participated in the study. Their age ranged between 13 to 19 years (*M* = 14.6 years). Prior to the study, informed consents of school administrators, parents, and adolescents were obtained. Participants filled out the questionnaires during school hours under supervision of their teacher and were reassured that the responses to the questionnaires would be anonymous and confidential. Only adolescents who indicated that they regulate their food intake at least sometimes were selected for the current study. This resulted in an effective sample size of 244 girls. On a scale from 1 to 7, the average score on eating regulation was 4.31, indicating that most participants in our sample were involved in at least some degree of eating regulation.

Measures

Body dissatisfaction and binge eating symptoms. Participants completed the body dissatisfaction (9 items) and bulimia (7 items) subscales of the Dutch version (Van Strien, 2002) of the Eating Disorders Inventory-II (EDI-II; Garner, 1991). The Body Dissatisfaction subscale measures "dissatisfaction with the overall shape and with the size of those regions of the body that are of greatest concern to those with eating disorders (i.e., stomach, hips, thighs, buttocks)" (Garner, 1991, p. 5). The Bulimia subscale assesses "the tendencies to think about and engage in bouts of uncontrollable overeating" (Garner, 1991, p. 5). One item was not included in the computation of the scale score ("i.e. "I have thought of trying to vomit in order to lose weight") since we were mainly interested in assessing binge eating rather than compensatory bulimic behaviours (see also Woods, Racine, & Klump, 2010). Each item was rated on 6-point frequency scale, ranging from 1 (*never*) to 6 (*always*). Item-mean scores were created with higher scores representing higher levels of body dissatisfaction and binge

eating symptoms. Previous studies indicated excellent validity for both subscales and adequate internal consistency in samples of nonclinical adolescent girls (Rosen, Silberg, & Gross, 1988; Shore & Porter, 1990). Also in a sample of Belgian adolescents, good validity and internal consistencies were reported (e.g., Soenens, Vansteenkiste, Vandereycken, Luyten, Sierens, & Goossens, 2008). In the current sample, Cronbach's alpha was .93 and .79 for body dissatisfaction and binge eating symptoms, respectively.

Eating regulation. Three items were taken from Pelletier et al. (2004) to tap into participants' general eating regulation efforts. The following items were used: 'To what extent are you trying to regulate your eating behaviours?', 'To what extent do you find it important to regulate your eating behaviours?', and 'To what extent do you intend to regulate your eating behaviours in the future?'. These items were rated on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much*). A higher score on these items indicates a stronger intention to regulate eating behaviours apart from the goals underlying the regulatory efforts and, thus, can be considered as a measure of the quantity or intensity of eating regulation. Cronbach's alpha of this 3-item scale was .88. Participants who indicated that they had no intention at all to regulate their eating behaviour (i.e., scoring lower than 2) were not included in the analyses. We did so because it is irrelevant for these participants to rate the type of goals they pursue through their eating regulation.

Eating regulation goals. An adapted version of the Aspiration Index (AI; Kasser & Ryan, 1996) was created to measure participants' goals for eating regulation. The original AI assesses people's extrinsic (i.e., wealth, fame, and image) and intrinsic (i.e., meaningful relationships, personal growth, community contributions, and good health) aspirations (Kasser & Ryan, 1996). Previous research demonstrated high reliability and validity for this questionnaire (e.g., Kasser & Ryan, 1996). Grouzet et al. (2005) demonstrated that the distinction between extrinsic and intrinsic goals is consistent across 15 cultures around the world in samples of undergraduate

students. In a sample of Belgian adolescents, good validity and internal consistencies (i.e., from .70 to .84) were reported (Duriez, Soenens, & Vansteenkiste, 2007). In the current study we assessed two types of goals, that is, the intrinsic goal of physical fitness and health (3 items) and the extrinsic goal of physical appeal and beauty (3 items). After reading the stem 'I regulate my eating behaviours because...', participants indicated on a 7-point Likert scale ranging from 1 (*not at all important*) to 7 (*very important*) how strongly they valued each of the eating regulation goals. Items referring to health-focused eating regulation were 'I want to keep fit', 'I want to be healthy', and 'I want to have a good physical condition'. Items referring to appearance-focused eating regulation were 'I want to have more muscles or be thinner to look more attractive', 'others would find me more attractive', and, 'I want to improve the shape of my body'. Exploratory factor analysis using promax rotation indicated that the items fell apart into two factors, together explaining 66% of the variance; all the items loaded on their intended factor, with no cross-loading exceeding .40. Cronbach's alpha was .83 and .87 for health-focused and appearance-focused eating regulation, respectively.

Diet-specific need frustration. To measure need frustration in the context of regulating eating behaviours, we created a new scale because such items were not available in the SDT literature when this study was conducted. Formulation of items was inspired by existing context-specific need satisfaction scales in other domains (e.g., Van den Broeck et al., 2010). Further, most studies have assessed (lack of) need satisfaction to examine associations with the goals or outcomes. Given recent evidence that lack of need satisfaction is not the same as need frustration (Sheldon et al., 2011) and the focus on the maladaptive side of eating regulation (i.e., binge eating symptoms), we chose to specifically measure need frustration in the context of eating regulation. Two items were formulated for each need: competence frustration (i.e., 'Sometimes I have the feeling that I'll never be able to regulate my food intake', 'Regulating my eating behaviours sometimes

seems an impossible task'), autonomy frustration (i.e., 'The fact that I cannot choose what I eat frustrates me', 'I have the feeling I have no other choice or am under pressure to regulate my eating behaviours'), and relatedness frustration (i.e., 'Regulating my food intake sometimes is a cause of tension with people who are important to me', 'Regulating my eating behaviours sometimes creates distance to other people'). Exploratory factor analysis revealed one factor explaining 48% of the variance and all items had a minimal loading of .70. Therefore, we created a need frustration composite score by averaging the six items (Cronbach's alpha = .86). A similar approach has been used in other studies (e.g., Bartholomew et al., 2011; Niemiec, Ryan, & Deci, 2009; Sebire et al., 2009).

Results

Preliminary Analyses

Table 1 presents descriptive statistics and bivariate correlations among the study variables. As can be noted, significant positive relations emerged between participants' Body Mass Index (BMI) and body dissatisfaction, intensity of eating regulation, appearance-focused eating regulation, and diet-specific need frustration. No significant correlations were found between age and the study variables. To investigate the association between educational level and the study variables a Multivariate Analysis of Variance (MANOVA) with educational level as independent variable was performed, revealing a significant multivariate effect, $F(6, 260) = 4.64$, $p < .001$, $\eta^2 = .10$. Participants following the academic track scored lower on body dissatisfaction [$M = 3.54$, $SD = 1.24$; $F(1, 265) = 8.49$, $p < .01$, $\eta^2 = .03$], diet-specific need frustration [$M = 2.26$, $SD = .94$; $F(1, 265) = 15.05$, $p < .01$, $\eta^2 = .05$], and binge eating symptoms [$M = 1.89$, $SD = .70$; $F(1, 265) = 15.80$, $p < .01$, $\eta^2 = .06$] compared to participants following a technical track ($M = 3.97$, $SD = 1.21$ for body dissatisfaction; $M = 2.65$, $SD = .91$ for need frustration and $M = 2.29$, $SD = .91$ for binge eating symptoms). Given the significant associations between educational level and

BMI and various study variables, we included them as covariates in further analyses.

Inspection of the correlations between our key study variables (see Table 1) revealed that body dissatisfaction was correlated positively with intensity of eating regulation, appearance-focused eating regulation, diet-specific need frustration, and binge eating symptoms, but was unrelated to health-focused eating regulation. Intensity of eating regulation was correlated positively with diet-specific need frustration and with both eating regulation goals. Further, whereas appearance-focused eating regulation was associated positively with diet-specific need frustration and binge eating symptoms, health-focused eating regulation was unrelated to these variables. Finally, diet-specific need frustration was associated positively with binge eating symptoms.

Primary Analyses

Measurement model. Before testing structural relations among the study variables, we created and inspected the quality of a measurement model representing each of the six study variables as latent variables. Body dissatisfaction and binge eating symptoms were indexed by three randomly created parcels. Diet-specific need frustration was indexed by three subscale scores (i.e., frustration of competence, relatedness, and autonomy). Intensity of eating regulation, and health-focused and appearance-focused eating regulation were represented by their respective items. In addition to these six latent constructs, the background variables BMI and educational level were represented as a latent dichotomous indicator by fixing the error variance of the indicator to 0.

As data screening indicated that assumptions of normality were violated in terms of skewness and kurtosis, χ^2=347.67, p<.001, we used the asymptomatic covariance matrix as input and checked the Satorra-Bentler (SB)- χ^2 to evaluate model fit. Other fit indices were the root-mean-square error of approximation (RMSEA), the standardized root-mean-square

residual (SRMR), and the comparative fit index (CFI). Combined cut-off values of .06 or lower for the RMSEA, and .09 or lower for the SRMR are considered a good model fit (Hu & Bentler, 1999). In addition, a CFI with values of .90 or higher reflects an acceptable fit (Bentler, 1990). Our measurement model, including 20 observed and 8 latent variables, had an excellent fit to the data, $SB\chi^2(42) = 229.98$, $p < .01$, RMSEA = 0.05, SRMR = 0.05, and CFI = 0.99. The factor loadings of the indicator variables were high, ranging from 0.65 to 0.96, all *p*s < .001.

Structural models. Next, we proceeded by estimating three structural models to test our main hypotheses. In each of these models, BMI and educational level were entered as control variables by allowing correlations with the exogenous latent factors and by drawing paths to each of the endogenous factors.

In the first model we examined the associations between intensity of eating regulation, diet-specific need frustration, and binge eating symptoms. In a first step we included intensity of eating regulation as a predictor of binge eating symptoms. Estimation of this model ($SB\chi^2(16) = 35.92$, $p < .01$, RMSEA = 0.07, SRMR = 0.04, CFI = 0.97) showed that the association between intensity of eating regulation and binge eating symptoms was significant ($\beta = 0.28$, $p < .05$). Second, we examined whether this association was mediated by diet-specific need frustration by modelling diet-specific need frustration as an intervening variable. Fit indices were satisfactory; $SB\chi^2(37) = 70.80$, $p < .001$, RMSEA = 0.06, SRMR = 0.05, CFI = 0.97. Intensity of eating regulation was related positively to diet-specific need frustration ($\beta = 0.29$, $p < .001$) which, in turn, was related positively to binge eating symptoms ($\beta = 0.43$, $p < .001$). Finally, allowing a direct path from intensity of eating regulation to binge eating symptoms ($\beta = .07$, *ns*) did not improve model fit ($\Delta SB\chi^2(1) = 0.80$, *ns*). Sobel's *z* indicated a significant indirect path from intensity of eating regulation to binge eating symptoms through diet-specific need frustration ($z = 2.57$, $p < .01$).

In the second model (Figure 1), we examined the associations between intensity of eating regulation, the two eating regulation goals, diet-specific need frustration, and binge eating symptoms. This model allowed us to examine the SDT-based hypothesis that the goals behind eating regulation would add to the prediction of diet-specific need frustration and binge eating symptoms in addition to the intensity of eating regulation per se[2]. The fit indices of the model in which intensity of eating regulation and the two eating regulation goals served as simultaneous predictors of diet-specific need frustration, which, in turn, was related to binge eating symptoms were good: $SB\chi^2(103) = 149.97$, $p < .001$, RMSEA = 0.04, SRMR = 0.05, and CFI = 0.98. The path from intensity of eating regulation to diet-specific need frustration was not significant ($\beta = 0.04$, *ns*), while the two eating regulation goals yielded an independent association with diet-specific need frustration: appearance-focused eating regulation was related positively to diet-specific need frustration ($\beta = 0.51$, $p < .001$) and health-focused eating regulation was related negatively to diet-specific need frustration ($\beta = -0.17$, $p < .05$). Diet-specific need frustration was related significantly to binge eating symptoms ($\beta = .38$, $p < .001$). Allowing direct paths from intensity of eating regulation ($\beta = .11$, *ns)*, health-focused eating regulation *(*$\beta = 0.05$, *ns)* and appearance-focused eating regulation *(*$\beta = -0.05$, *ns) to* binge eating symptoms did not improve the model fit, $\Delta SB\chi^2(3) = 1.54$, *ns.* Moreover, Sobel's *z* revealed that appearance-focused eating regulation ($z = 3.80$, $p < .001$) and health-focused eating regulation ($z = -1.87$, $p = .05$) both yielded a significant indirect relation to binge eating symptoms.

[2] As suggested by one of the reviewers, we tested interaction effects between the eating regulation goals and intensity of eating regulation. The interaction effect between health-focused eating regulation and intensity of eating regulation on diet-specific need frustration ($\beta = .01$, *ns*) and binge eating symptoms ($\beta = .02$, *ns*) was not significant. Also the interaction effects between appearance-focused eating regulation and intensity of eating regulation on diet-specific need frustration ($\beta = .08$, *ns*) and binge eating symptoms ($\beta = -.01$, *ns*) were not significant. This suggests that the eating regulation goals yield a similar relation to need frustration and binge eating symptoms, regardless of participants' level of eating regulation.

In a third model we included body dissatisfaction as a predictor of intensity of eating regulation and both eating regulation goals. In this model [$SB\chi^2(149) = 211.25$, $p < .001$, RMSEA = 0.04, SRMR = 0.06, and CFI = 0.98] body dissatisfaction was positively related to intensity of eating regulation ($\beta = 0.31$, $p < .001$) and appearance-focused eating regulation ($\beta = 0.65$, $p < .001$) and was unrelated to health-focused eating regulation ($\beta = 0.09$, *ns*). Next, we tested whether allowing direct paths from body dissatisfaction to diet-specific need frustration and binge eating symptoms would improve the model fit. Allowing both paths simultaneously resulted in a significantly improved model fit, $\Delta SB\chi^2(2) = 10.88$ $p < .001$, with body dissatisfaction relating positively to diet-specific need frustration ($\beta = 0.33$, $p < .001$), while being unrelated to binge eating symptoms ($\beta = -0.10$, *ns*). By including the direct path from body dissatisfaction to diet-specific need frustration, the association between health-focused eating regulation and diet-specific need frustration became non-significant ($\beta = -0.11$, *ns*). Finally, as for the indirect effects, Sobel's *z* indicated an indirect association between body dissatisfaction and diet-specific need frustration ($z = 2.03$, $p < .05$) through appearance-focused eating regulation as well as an indirect association between body dissatisfaction and binge eating symptoms ($z = 2.32$, $p < .05$) through diet-specific need frustration. Together, these findings suggest that body dissatisfaction has a direct positive association with diet-specific need frustration but also an indirect association through appearance-focused eating regulation. After inclusion of body dissatisfaction as a predictor, the indirect effect of health-focused eating regulation on binge eating symptoms became non-significant ($z = -1.32$, ns), whereas the indirect effect of appearance-focused eating regulation on binge eating symptoms remained significant ($z = 1.96$, $p < .05$). This final model, which had an excellent fit [$SB\chi^2(148) = 201.223$, $p < .001$, RMSEA = 0.04, SRMR = 0.05, and CFI = 0.99], is graphically displayed in Figure 2.

Discussion

The central tenet within the Dietary Restraint Theory (Herman & Polivy, 1980) is that restraining food intake contributes to disinhibited eating. A multitude of studies have addressed this question, with some studies supporting the dietary restraint hypothesis (e.g., Ouwens et al., 2009), but others finding no evidence (e.g., Cooley & Toray, 2001) or even opposite evidence (e.g., Groesz & Stice, 2007).

In this study, we found that eating regulation was related positively to binge eating symptoms, thereby confirming Dietary Restraint Theory. On the basis of SDT, we expected that any association between eating regulation and binge eating symptoms might be due to experiences of need frustration and the data confirmed this expectation. Apparently, regulating one's eating pattern, on average, relates to experiences of diet-specific need frustration that, in turn, relate to binge eating symptoms. Possibly, regulating one's eating pattern might bring about feelings of pressure because it may be hard to ignore physiological cues and resist the temptation of old eating habits. Also, it may bring about feelings of incompetence and disappointment because eating regulation is considered a challenging endeavour that almost inevitably sometimes leads to failure. Such feelings of need frustration might in turn relate to binge eating symptoms because, when people's needs are frustrated, they might experience more negative affect while simultaneously having less energy available to deal with stressors in a constructive fashion. Instead, they may look for short-cuts to obtain a sense of well-being and they may engage in binge eating as a compensatory, yet derivative, way to restore positive affect and deal with stress (Heatherton & Baumeister, 1991; Ryan et al., 2006; Stice, 2001).

Having established this average association between eating regulation, need frustration, and binge eating symptoms, a next aim was to examine whether two goals behind eating regulation would relate differentially to diet-specific need frustration and binge eating symptoms.

Understanding the Frustrating Effect of Eating Regulation: The Quality of Goals Matters

To date, little attention has been given to the goals underlying individuals' eating regulation attempts. Most studies assessed dietary restraint without considering the motivational basis for restraining food intake. In the current study we found that (a) appearance-focused eating regulation and health-focused eating regulation have different correlates with diet-specific need frustration and binge eating symptoms and (b) the quality of these goals seems to be more strongly related to diet-specific need frustration and binge eating symptoms than the intensity of eating regulation per se.

In line with our hypothesis, appearance-focused eating regulation was related positively to diet-specific need frustration and binge eating symptoms, while health-focused eating regulation was either unrelated or even related negatively to diet-specific need frustration and binge eating symptoms. These findings are in line with the findings of de Souza et al. (2010) that engagement with the goal of appearance is associated with more problematic weight control and with the findings of Putterman and Linden (2004) that appearance-focused dieting is associated with more disinhibited eating compared to health-focused dieting. These findings are also consistent with SDT's differentiation between intrinsic (such as health) and extrinsic goals (such as appearance), which are said to be differently linked to basic need satisfaction and frustration (Kasser & Ryan, 1996).

Our study suggests that appearance-focused eating regulation is associated with binge eating symptoms because of its associations with feelings of pressure (i.e., having no choice in what one eats), incompetence (feeling unable to control eating behaviours) and interpersonal tension (feeling unsupported by others in the eating regulation efforts). A number of speculative explanations can be provided as to why appearance-focused eating regulation is associated with more diet-specific need frustration compared to health-focused eating regulation. In the current society the ideal

for physical attractiveness is extremely thin and unachievable for most women (e.g., Thompson & Stice, 2001). Therefore, adolescents who focus on appearance might have more rigid or strict dietary rules to achieve this thin-ideal and, thus, feel more incompetent or pressured in their regulatory attempts. Furthermore, studies within the context of exercising suggest that appearance-focused exercising is associated with a stronger focus on outcome and performance, whereas health-focused exercisers are more focused on the process of exercising (Crawford & Eklund, 1994; Vansteenkiste, Matos, Lens, & Soenens, 2007). In a similar vein, the outcome of achieving a desired weight and figure could be central in case of appearance-focused eating regulation (e.g., weighing themselves more often, comparing their looks with other girls, …), whereas the process of moving towards a different lifestyle might be central to health-focused eating regulation (e.g., Vansteenkiste et al., 2008). Compared to a process focus, an outcome focus might be relatively more stressful and might more easily give rise to feelings of need frustration such as pressure and incompetence (Vansteenkiste et al., 2008). Further research is needed to explain whether these or other processes can account for the association between appearance-focused eating regulation and diet-specific need frustration.

The positive association between appearance-focused eating regulation and diet-specific need frustration adds to previous SDT-based research on the association between goals and needs. Most previous studies within SDT focused on the associations between intrinsic goals and need satisfaction (e.g., Vansteenkiste et al., 2008). This is probably because SDT grew from a positive approach to human functioning with a strong focus on positive outcomes such as wellbeing and vitality. Although SDT also maintains it can explain the more 'dark side' of human functioning (Ryan & Deci, 2000b), relatively few studies have focused on need frustration to understand individuals' maladaptive functioning (e.g., Sheldon et al., 2011). The current findings suggest that the basic needs can indeed explain more maladaptive processes and outcomes as appearance-focused eating

regulation (i.e., an extrinsic goal) was associated with more diet-specific need frustration and binge eating symptoms. Future research would do well to also include measures of need satisfaction and more adaptive outcomes, such as healthy eating. We anticipate that health-focused eating regulation might be more strongly related to need satisfaction and such positive outcomes than to need frustration and pathological outcomes.

The importance of examining eating regulation goals was underscored by the finding that the goals were more strongly and more consistently related to diet-specific need frustration and binge eating symptoms than the intensity of eating regulation per se. After taking into account participants' eating regulation goals, the initially observed association between intensity of eating regulation and diet-specific need frustration even turned out to be non-significant. This is presumably the case because a strong focus on eating regulation in a group of normal-weight youngsters is often motivated by the pursuit of physical appeal and attractiveness. When controlling for the shared variance between both, it appears that it is not so much intensity of eating regulation in itself that is need frustrating, but the strong focus on physical appearance. Put simply, not the degree but the type of goals underlying eating regulation determines whether eating regulation is associated with more diet-specific need frustration and, hence, with more binge eating symptoms.

We would like to note that, different from previous work (e.g. Van Strien, 1999), our eating regulation measure (Pelletier et al., 2004) tapped into the general regulation of one's eating pattern rather than into the more narrow construct of restraint. Restriction of food intake represents only one mean to regulate one's food intake as one can also regulate one's eating pattern by developing a different eating style. We chose to use this more general measure of eating regulation because we believe that this measure can be more easily tied to different types of goals one may want to achieve through regulating one's eating pattern. However, it is possible that dietary restraint is inherently more need frustrating compared to eating regulation in

general. Therefore, it is possible that dietary restraint would have had an independent association with diet-specific need frustration and binge eating symptoms beyond the type of goals underlying restraint.

Body Dissatisfaction as an Antecedent of Eating Regulation Goals

Another aim of this study was to investigate body dissatisfaction as an antecedent of intensity of eating regulation and both eating regulation goals. Although it is often assumed that body dissatisfaction is the motivating force of eating regulation, we wanted to investigate whether it is related to any kind of eating regulation, or rather to a more specific kind of eating regulation. In addition, we examined whether the association between body dissatisfaction and binge eating symptoms (Stice, 2002) would be mediated by associations with the eating regulation goals and diet-specific need frustration.

As expected, a strong positive association emerged between body dissatisfaction and appearance-focused eating regulation. This indicates that adolescents who are dissatisfied with their body more often regulate their eating behaviours to improve their appearance. Also, a strong positive association emerged with intensity of eating regulation. This is in line with other studies revealing a positive association between body dissatisfaction and intensity of eating regulation (Stice, 2002). In contrast, we found that body dissatisfaction was not significantly associated with health-focused eating regulation. This suggests that body dissatisfaction is predominantly related to one type eating regulation, that is, eating regulation based on the goal of physical appearance.

Further, we found that the association between body dissatisfaction and diet-specific need frustration and binge eating symptoms is not fully accounted for by the eating regulation goals. Allowing a direct relation from body dissatisfaction to diet-specific need frustration significantly improved the model fit, which indicates that body dissatisfaction has an association with diet-specific need frustration beyond its associations with eating

regulation goals. In other words, the results indicate that individuals who are dissatisfied with their body size and shape experience more need frustration in the context of eating regulation independent of the type of goals they pursue. We speculate that other motivational processes could explain this path. For instance, body dissatisfied individuals might regulate their eating pattern for more pressuring or demanding reasons, which in turn explains more diet-specific need frustration (e.g., Pelletier et al., 2004). Also, body dissatisfied individuals might disengage from any eating regulation goal as they feel discouraged in their pursuit of a more attractive appearance through dieting. This sense of amotivation and helplessness could, however, still trigger more diet-specific need frustration as people remain feeling incompetent about their eating behaviours.

Body dissatisfaction was related indirectly to binge eating symptoms through its associations with appearance-focused eating regulation and diet-specific need frustration. These findings suggest that body dissatisfied adolescents are vulnerable to binge eating symptoms because they directly and indirectly (i.e., through the type of goals they pursue) feel frustrated in their needs in the context of eating regulation.

Limitations and Future Research Suggestions

Although our study reveals some interesting results, some limitations need to be mentioned. First, because of the cross-sectional design of our study, no conclusion concerning causality and direction of effects in the models can be drawn. Possibly, the variables depicted in Figures 1 and 2 have a reciprocal association with one another. For instance, although body dissatisfaction is depicted as an antecedent in the path models it might also be a consequence of eating regulation goals. Adolescents with a strong focus on appearance whilst regulating their eating behaviours might feel more dissatisfied with their body because their focus on appearance triggers body dissatisfaction (e.g., through using more social comparison). The direct path from body dissatisfaction to diet-specific need frustration might also be

reversed. After feeling incompetent or pressured in one's eating behaviours or after receiving a critical remark about what one eats, body dissatisfaction might be triggered.

Another limitation is the sample of our study. Participants were not selected based upon their active engagement with eating regulation, but were part of a secondary school in Belgium. This is not problematic in itself as eating regulation and weight control are very salient issues for many adolescent girls (Neumark-Sztainer & Hannan, 2000). Indeed, the mean on the scale for intensity of eating regulation was above the midpoint in this sample. In spite of this, our group might not be representative for the population of adolescent girls who are actively trying to restrict their eating behaviours, for example through low-calorie diets. Therefore, it is necessary to include more diverse samples, including clinically overweight individuals, in future studies in order to generalize these findings to other groups.

A third methodological limitation is that no well-validated existing scales were available for the measurement of a number of study constructs such as diet-specific need frustration and eating regulation goals. Accordingly, we had to adjust extant measures for our research purposes. In doing so we based ourselves strongly on existing scales with sound psychometric characteristics (e.g., the AI) and our scales had a good structure validity and internal consistency. Nevertheless, more information about the validity of these scales would have been useful. As for the measure of intensity of eating regulation, more information is needed about the relationship of this scale to prevailing dietary restraint scales. Although we intended to measure eating regulation more broadly than dietary restriction alone in order to have a 'goal-neutral' measurement, the disadvantage of this scale is that it is rather unclear exactly how these items were perceived by participants. That is, did they interpret the scale spontaneously in terms of dietary restriction or in terms of adopting a different eating style?

A fourth, more conceptual, limitation was our focus on binge eating symptoms as an outcome. We focused upon this outcome because the

relationship between eating regulation and binge eating symptoms has received a lot of attention in the literature and has yielded inconsistent results. We believe that implementing a motivational perspective in the study of this particular outcome represents a starting point for developing a more systematic research line dealing with a diversity of both healthy and unhealthy eating behaviours. Future research may want to examine the link between need satisfaction and a more diverse range of eating behaviours to arrive at a more comprehensive understanding of the importance of motivational concepts in this area. In doing so, it would be critical to not limit oneself to the goals or the "What" of eating regulation, but also to study people's motives underlying their eating regulation (e.g., because my partner expects me to do so; because I would feel guilty if I wouldn't do so; Pelletier et al., 2004).

Practical Implications

In spite of the aforementioned limitations, our study yields some interesting findings that might have implications for health policy and health care providers working with adolescent girls. First, because of inconsistent findings in previous studies, no clear guidelines for health policy related to dieting or eating regulation are available (e.g., Herman, Polivy, & Leone, 2005; Groesz & Stice, 2007). The present study suggests that appearance-focused eating regulation in particular, rather than eating regulation per se, may be discouraged in adolescent girls. Second, our study suggests that health-focused eating regulation represents a more positive alternative to appearance-focused eating regulation. This type of goal was not associated or even negatively related to diet-specific need frustration, meaning that it did not engender feelings of pressure, incompetence, and social tension. This suggests that, rather than motivating adolescents to change their eating habits to feel good about their body appearance, more attention could be devoted to the importance of health and physical fitness. Now, preventive campaigns for overweight and commercial weight-loss programs (e.g., Weight

Watchers) seem to motivate people to eat more healthily by emphasizing the benefits for their health, but often also by emphasizing the benefits in terms of appearance and shape (e.g., "boost your self-esteem by looking better"). Although not investigated in the context of eating regulation, studies in the context of exercising suggest that promoting appearance-goals, rather than health-goals, has an effect on adolescents' absorption during exercising, their performance and subsequent persistence (Vansteenkiste et al., 2004). In a similar vein, prevention campaigns focused on promoting health-focused eating regulation, rather than on appearance-focused eating regulation, might stimulate a less problematic and more flexible type of eating regulation which in turn could have longstanding effects on one's eating behaviours. However, more research is needed to confirm these hypotheses and provide evidence-based guidelines.

A third finding concerns the importance of body dissatisfaction, which was both directly and indirectly (through appearance-focused eating regulation) related to diet-specific need frustration. This suggests that body dissatisfied adolescents are particularly vulnerable for the adverse effects of eating regulation. This finding is in line with many other studies pointing to the role of body dissatisfaction as a risk factor for binge eating symptoms (Stice, 2002) and thus confirms the importance of improving body esteem in adolescent girls. Decreasing the adoption of the thin-ideal (e.g., Stice, Rohde, Gau, & Shaw, 2009) and challenging the message that having an attractive appearance is essential for one's happiness (e.g., Evans, 2003) could be one path towards a less need-frustrating eating style.

Conclusion

The Dietary Restraint Model, which deals with the association between eating regulation and binge eating symptoms, has attracted a lot of attention in the literature. We believe that by applying well-validated motivation theories, like SDT, to the study of eating regulation, a refreshing light can be shed on this topic. Indeed, the findings of the present study

suggest that it is critical to move beyond the study of intensity of eating regulation per se and to consider the goals underlying eating regulation to understand when eating regulation is associated with diet-specific need frustration and binge eating symptoms. Appearance-focused eating regulation seems to be rooted in dissatisfaction with one's body, seems to be experienced as need frustrating, and is associated with binge eating symptomatology. Practitioners may consider discouraging an appearance focus during eating regulation and instead promote health-focused eating regulation.

Table 1

Means, standard deviations, and bivariate correlations between measured variables

	Mean	SD	1	2	3	4	5	6	7	8
1. BMI	19.65	2.70	1							
2. Age	14.59	1.29	.31**	1						
3. Body dissatisfaction	3.73	1.22	.41**	-.04	1					
4. Intensity of ER	4.58	1.22	.19**	.02	.31**	1				
5. Health-focused ER	5.42	1.18	-.09	-.02	.01	.39**	1			
6. Appearance-focused ER	4.60	1.49	.23**	.05	.55**	.58**	.32**	1		
7. Basic need frustration	2.44	0.83	.25**	-.03	.52**	.29**	.04	.43**	1	
8. Binge eating symptoms	2.08	0.84	.09	-.03	.22**	.12	-.00	.20**	.37**	1

Note: ** $p < .001$. ER = eating regulation.

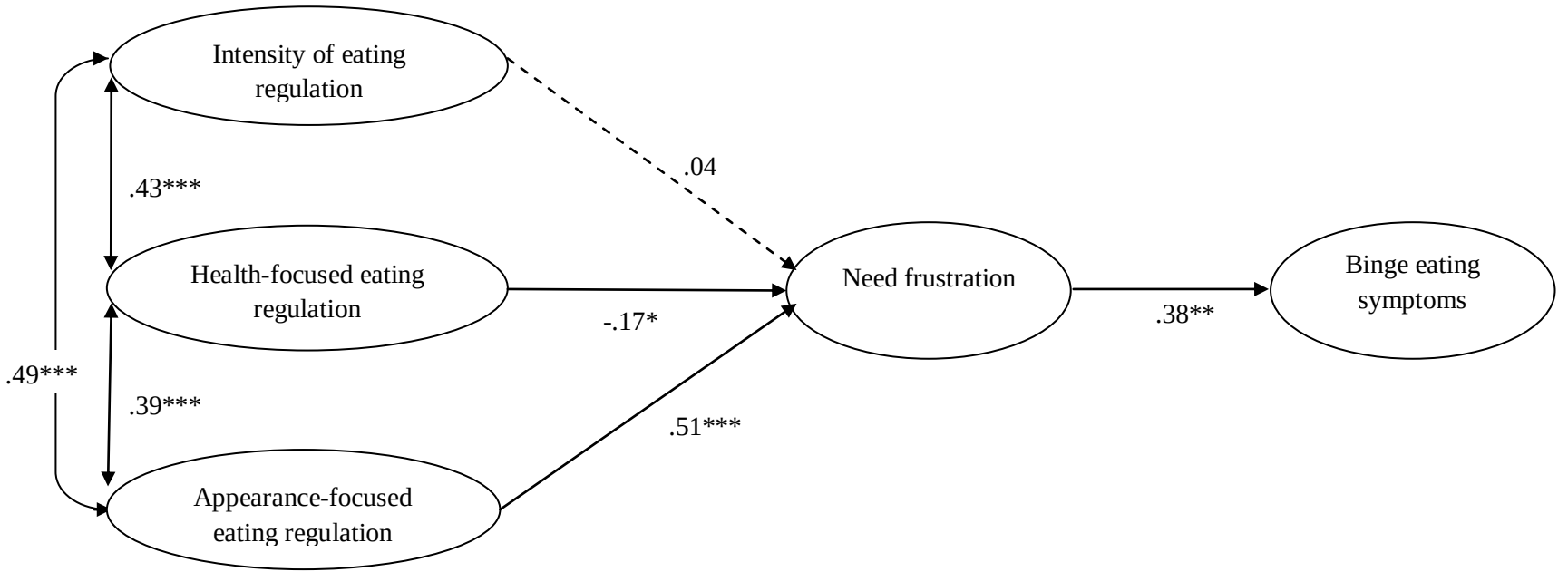

Figure 1. Structural model of the relationships between intenstity of eating regualtion, health- and appearance-focused eating regulation, diet-specific need frustration, and binge eating symptoms.

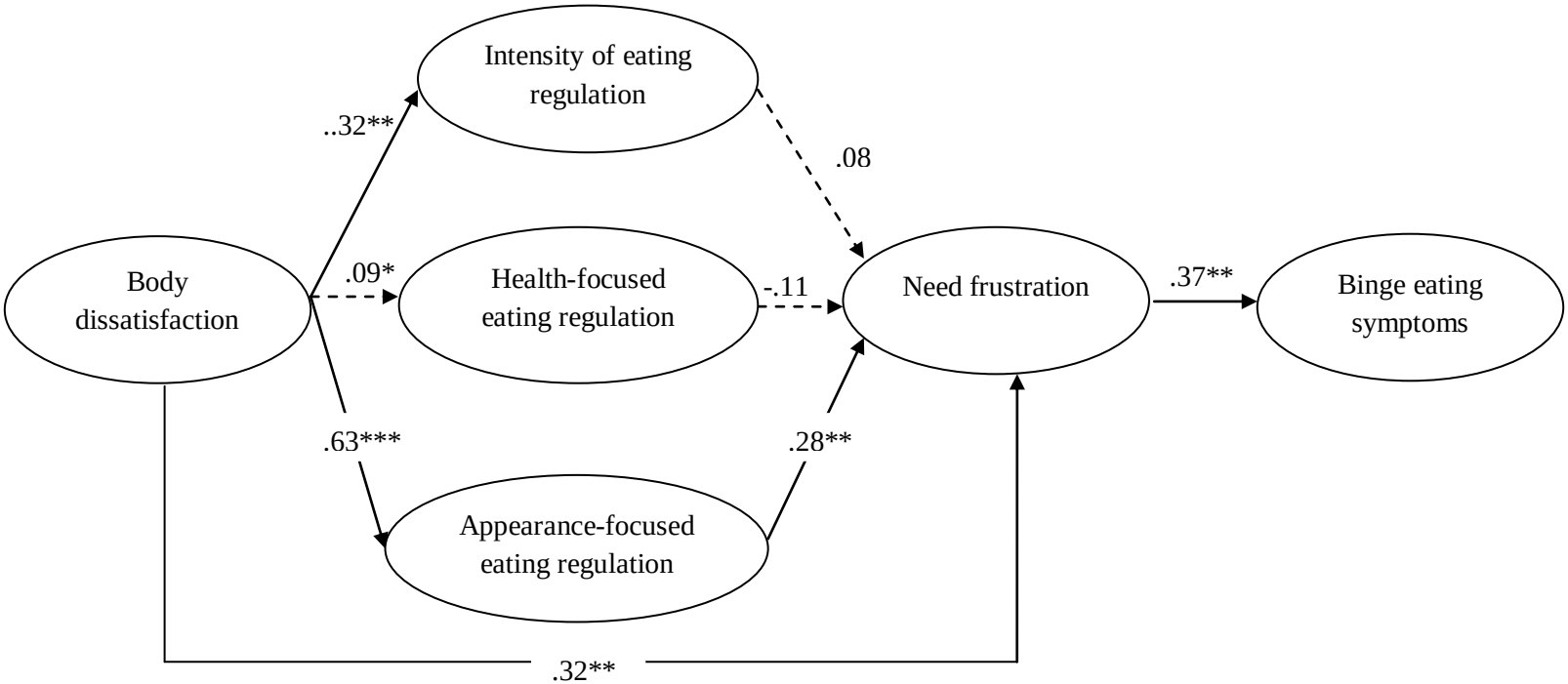

Figure 2. Structural model of the relationships between body dissatisfaction, intenstity of eating regulation, health- and appearance-focused eating regulation, need frustration, and binge eating symptoms.

Chapter 4

Dieting in Vain? Longitudinal Associations Between Eating Regulation Motives, Eating Behaviours, and Weight Changes in Individuals Following a Weight Watchers Program[1]

Because controversy exists about whether dieting yields a positive or negative influence on weight and eating behaviours, recent studies on dieting behaviours aim to detect factors and processes that explain both successful and unsuccessful dieting behaviours. Based on Self-Determination Theory, the current longitudinal study investigated the role of eating regulation motives in predicting 18-month changes in weight, healthy eating behaviours, disordered eating symptoms (drive for thinness and binge eating symptoms) and dietary exhaustion in a group of individuals (N = 458 at T1, 95.2% female) participating in a commercial weight loss program, that is, Weight Watchers. Results indicated that more voluntary motives for eating regulation at baseline related to adaptive changes, whereas more pressuring motives related to problematic changes in the outcomes. Changes in psychological need satisfaction and frustration were related to changes in the outcomes and could partially account for the relations between eating regulation motives and outcomes. Finally, no significant differences emerged in the relationships between the motives and outcomes for normal-weight, overweight, and obese participants. It is concluded that the type of motives underlying individuals' eating regulation and the process of psychological need satisfaction and frustration can help to explain when and why eating regulation is exhausting or successful.

[1] Verstuyf, J., Vansteenkiste, M., Chen, B., Soenens, B., Van der Kaap, J., & Boone, L. (2014). Dieting in vain? Longitudinal associations between dietary motives, eating behaviours, and weight loss in a group of individuals following a Weight Watchers program. *Unpublished manuscript*.

Introduction

In current western society, many people try to restrict their eating behaviours to lose or maintain their weight (Andreyeva, Long, Henderson, & Grode, 2010). Given these well-meant dieting attempts, it is somewhat surprising that so many people fail to achieve or maintain a healthy weight (Mann et al., 2007). Consistent with these real-life observations, past research has shown that, although dieting is effective in the short term, lost weight is often regained once the dieting intervention stops (Mann, et al., 2007; Wooley & Garner, 1991). Besides being ineffective, longitudinal studies indicate that dietary restraint, which is the cognitive intention to restraint food intake (van Strien, 1999), even constitutes a risk factor for the onset of disordered eating symptoms, such as excessive concerns over eating and weight (drive for thinness) and binge eating symptoms (Liechty & Lee, 2013; Polivy & Herman, 1985; Stice, 2001; Stice, Davis, Miller, & Marti, 2008).

Yet, the picture is not completely pessimistic, as some studies have provided evidence for positive effects of dieting behaviours on weight and eating behaviours (Stroebe, van Koningsbruggen, Papies, & Aarts, 2013). For instance, Kraschnewski and colleagues (2010) reported that one out of six adults in the US are able to maintain weight loss of at least 10% for more than one year. Also Wing and Hill (2001) concluded in their review that about 20% of overweight and obese persons are successful in their diets, with success defined as at least 10% weight loss sustained for minimally one year. Further, experimental trials indicate that being assigned to a dieting intervention, relative to a waitlist condition, led to significant decreases in binge eating in obese (Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998; Reeves et al., 2001), overweight (Klem, Wing, SimkinSilverman, & Kuller, 1997), and normal-weight (Stice, Presnell, Groesz, & Shaw, 2005) individuals.

Given these mixed results, researchers have been eager to gain insight into this *dieting mystery*, thereby examining whether and when

dietary restraint is effective and why dieting attempts so often fail (Stroebe, et al., 2013). For instance, some researchers have focused on people's type of dieting behaviours (Groesz & Stice, 2007; Westerberg-Jacobson, Ghaderi, & Edlund, 2012), whereas other researchers have paid attention to the psychological mechanisms underlying successful dieting (Stroebe, et al., 2013). Detecting such mechanisms is of major importance for health care providers who try to support their clients in their struggle against overweight and obesity, as the identification of these mechanisms provides a first insight in the type of guidelines health care provides may rely on in their counseling.

In this context, it is remarkable that few studies have investigated the role of motivational processes underlying dieting behaviours. This is surprising because dieting requires psychological energy and taps into the psychological resources of dieters (Baumeister & Heatherton, 1996; Vohs & Heatherton, 2000) and motivational processes may impact on the amount of energy dieters have available to continue their initiated changes and to resist eating unhealthy food (Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012). Perhaps the limited amount of attention devoted to motivational processes is due to a dominating quantitative view on motivation, which addresses 'the extent' to which people are motivated to diet (e.g., Miller & Rollnick, 2002). However, in the field of motivation psychology, it is increasingly emphasized that, in addition to the quantity or intensity ("how much") of motivation, also the type or quality of motivation ("why") plays an important role in understanding individuals' eating behaviours (Deci & Ryan, 2000; Ryan & Deci, 2000). Within the current longitudinal study, spanning 18 months, we draw upon Self-determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010), a broad theory on human motivation, to investigate whether types of motives underlying the eating regulation of dieters participating in a commercial weight loss program (i.e., Weight Watchers) would predict changes in

healthy eating behaviours, weight and disordered eating symptoms (i.e., binge eating and drive for thinness) over time.

Why do You Regulate Your Eating Behaviours? A Self-Determination Theory Perspective

Initially, motivational scientists (Deci, 1972; Harter, 1981) distinguished between intrinsic and extrinsic forms of motivation, with intrinsic motivation referring to performing activities for the interest, enjoyment, and challenge the activity provides and extrinsic motivation referring to performing activities to achieve an outcome that is separable from the activity itself. Yet, beginning with the seminal contribution by Ryan and Connell (1989), subsequent work in the SDT-tradition made it increasingly clear that several subtypes of extrinsic motivation can be distinguished depending upon the degree to which the reason for enacting the requested behaviour has been internalized or owned. Internalization is defined as "people's taking in a value or regulation and transforming it into their own so that, subsequently, it will emanate from their sense of self" (Ryan & Deci, 2000, p. 71). In other words, extrinsically motivated behaviour varies in the extent to which people feel the behaviour originates from externally imposed pressures or, in contrast, is grounded in self-endorsed convictions. It is precisely the more voluntary rather than pressured character which is considered critical, more than whether the behaviour is intrinsically or extrinsically motivated. Therefore, the traditional distinction between extrinsic and intrinsic motivation has been replaced by the distinction between controlled and autonomous motivation (e.g., Vansteenkiste, Lens, & Deci, 2006).

Two subtypes of controlled motivation have been distinguished (Ryan & Deci, 2000; see Table 1). *External regulation*, the most pressured form of regulation, is characterized by performing an activity because of the anticipated rewards and appreciation for successfully performing the behaviour or anticipated punishments and criticism for failing to (successfully) engage in the requested behaviour. *Introjected regulation*

refers to performing a behaviour out of internal pressures, such as the avoidance of feelings of guilt or shame and gaining a sense of contingent self-worth. Further, three types of *autonomous* motives have been distinguished. A more autonomous form of regulation constitutes *identified regulation*, in which case the person identifies with the personal value of the behaviour. If the personally valued behaviour has become an integral part of one's lifestyle and fits with other self-endorsed life goals and values, the behavioural regulation is said to be *integrated*. Finally, *intrinsic* motivation involves engaging in an activity for the inherent enjoyment of the activity.

The distinction between these forms of regulation can be easily applied to eating regulation. For example, regulating one's eating behaviour and weight might be a personally valued goal for some dieters because being fit provides the necessary energy to pursue important life goals, such as spending time with the children. In this case, eating regulation has become a priority for which one has fully chosen (i.e., identified and integrated motivation). For some, eating regulation might even become enjoyable (i.e., intrinsic motivation), for instance, when dieters gain pleasure in cooking healthy and varied meals (Teixeira et al., 2010). However, it is often the case that individuals also regulate their eating behaviours of external and internal pressures, in part due to the stigma that exist concerning weight and obesity in Western society. For instance, overweight persons are considered less successful, less 'in-control' and less attractive (Ogden, 2010). In contrast, slenderness is associated with various positive attributes, resulting in a widespread belief that being slender would entail greater social acceptance and love and greater personal success in life (Dittmar, 2007; Evans, 2003). Dieters' functioning may be influenced by these prevailing societal messages, such that they believe that losing weight will result in external rewards, such as professional success (i.e., external motivation), while others may lose weight to buttress feelings of shame and guilt (i.e., introjected motivation).

Although the role of these more pressuring or controlled and these voluntary or autonomous forms of regulation has received widespread attention in life domains such as education, work, physical activity, and health care (e.g., Teixeira, Carraca, Markland, Silva, & Ryan, 2012), the body of work in the field of eating regulation and weight loss is more limited, in spite of the claim that these motivational subtypes should relate to the outcomes of eating regulation (Marques et al., 2013; Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012). For instance, autonomous eating regulation has been found to relate concurrently to fewer bulimic symptoms in a sample of university students (e.g., Pelletier & Dion, 2007) and to predict a reduction in percentage of calories from total and saturated fats over a 26-week period in a sample of patients at risk for coronary artery disease (Pelletier et al., 2004). Besides of predicting a reduction in maladaptive eating behaviours, autonomous regulation also related to more adaptive eating behaviours, like a healthy eating pattern (Otis & Pelletier, 2008). Finally, highly controlled, relative to autonomous, eating regulation was found to relate to more extreme and rigid dieting behaviours across a 5-month period (Strong & Huon, 1999), with this type of dieting being shown to predict less successful weight control (Teixeira, et al., 2010).

Further, studies among clients involved in a clinical weight loss program have shown that being autonomously motivated to enter weight loss treatment related to greater weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996) and decreased disinhibited (i.e. uncontrolled eating), emotional (i.e., eating in response to negative emotions) and external eating (i.e., eating in response to the availability of food) at the end of the interventions (Mata et al., 2009; Williams, et al., 1996). Finally, a study involving an online intervention showed that experimentally increasing autonomous motivation resulted in greater weight loss for those who had controlled motives at baseline (Webber, Gabriele, Tate, & Dignan, 2010).

Understanding the Effect of Motivation underlying Eating Regulation: The Role of Psychological Needs

To understand why some motives for eating regulation yield (un)desirable eating outcomes, the concept of psychological needs is invoked within SDT. According to the theory, three basic psychological needs are central to individuals' goal pursuit and activity engagement across life domains (Vansteenkiste, et al., 2010), that is, the needs for autonomy (e.g., experiencing a sense of volition and willingness), competence (i.e., experiencing a sense of effectiveness and mastery) and relatedness (i.e., feeling cared for by others). If people experience a sense of volition, mastery, and relational connectedness, they are more likely to persevere in their behaviour and to transfer their behaviours across situations (Vansteenkiste, et al., 2010), presumably because need satisfaction engenders psychological energy, vitality, and well-being (Deci & Ryan, 2000; Moller, Deci, & Ryan, 2006; Ryan, Bernstein, & Brown, 2010; Ryan & Deci, 2008).

When these same psychological needs get frustrated, people end up feeling exhausted (e.g., Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008). Indeed, it is increasingly recognized that the presence of active need frustration may represent a separate pathway from need satisfaction, a pathway that would primarily account for the 'dark' side of human functioning in general and eating outcomes in particular (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Vansteenkiste & Ryan, 2013). In line with this assumption, recent studies found psychological need frustration to relate to binge eating symptoms at both the interpersonal level (Schueler & Kuster, 2011; Verstuyf, Vansteenkiste, & Soenens, 2012) and at the day-to-day level (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013). Further, in a sample of female athletes, psychological need frustration during practice related to disordered eating (Bartholomew, et al., 2011). In a recent study, psychological need frustration was also related to increases in binge eating symptoms over a 6-month period (Boone,

Vansteenkiste, Soenens, Van Der Kaap-Deeder, & Verstuyf, in press). Finally, Ng and colleagues (Ng, Ntoumanis, Thogerson-Ntoumani, Stott, & Hindle, 2013) found that autonomy supportive practices by others towards individuals with weight-loss goals resulted in more need satisfaction and life satisfaction, whereas controlling practices resulted in more need frustration and unhealthy diet strategies.

Whereas individuals with autonomous motives for eating regulation may generate their own opportunities for need satisfaction along the way, those with more controlling motives may experience their eating regulation as more frustrating of their psychological needs. Consistent with such a reasoning, autonomous motives for decision making (Chen, Vansteenkiste, Beyers, Soenens, & Van Petegem, 2013) and for general goal pursuit (Sheldon & Elliot, 1999) was related to greater need satisfaction. It remains to be examined, however, whether the dynamics of need satisfaction and need frustration may also account for the association between motives for eating regulation and eating outcomes.

The Present Study

In the present study we aim to investigate motives underlying eating regulation in a group of active dieters, that is, participants of a Weight Watchers program. Weight Watchers is a commercial self-help group in which coaches and peers support each other in the process of losing or maintaining weight. During their weekly gathering, participants are weighted, receive eating advice and products and peer support is provided. The program of Weight Watchers involves high monitoring of food intake and restriction to a limited amount of "points" (i.e., points are appointed to foods in terms of its' caloric value and nutritional composition) which can be eaten on a particular day. The number of points that can be eaten by a particular dieter is dependent upon weight, gender, age and aspired weight loss. However, most dieters get 24 to 30 points, equivalent to 1200 to 1400 calories per day. A diverse group of participants is present in terms of weight

status, that is, some participants are normal-weight and others are overweight or obese. The present longitudinal study, spanning a 18-month interval, aimed to extend the present body of work on motives underlying eating regulation in four ways.

First, rather than focusing on the role of motivation for treatment as is the case in treatment studies on weight loss (e.g., Williams et al., 1996), the present study examined motives for eating regulation as such. Second, most previous correlational studies were conducted in groups of normal-weight university students, with the exception of Pelletier et al. (2004) who studied a sample of patients at risk for coronary artery disease. By sampling both normal-weight and overweight individuals, the present study allowed for a direct test of differences in relations, between individuals with a diverse weight status, between motives and eating behaviours. Third, most of the previous correlational studies were either cross-sectional in nature or only included short-term follow-up assessments (i.e., max. 5 months after baseline assessment). From both a theoretical and applied perspective, long term follow-ups are critical as the beneficial or harmful effect of particular types of motives might only show up after extended periods of time. The present study included a follow-up assessment 18 months after the initial assessment. Finally, content-wise, the present study extended past work by (a) examining the unique contribution of the different types of autonomous (i.e., identified and intrinsic) and controlled (i.e., external and introjected) motives in predicting eating outcomes, (b) including a variety of both adaptive (i.e., healthy eating, weight loss) and dysfunctional (i.e., exhaustion, drive for thinness, and binge eating symptoms) outcomes, and (c) investigating the role of psychological need satisfaction and need frustration as an explanatory mechanism between motives for eating regulation and eating outcomes.

Although weight loss is often conceived as the ‘key’ outcome in dieting studies, we deemed it important to include a wide range of both adaptive and more maladaptive eating outcomes. Indeed, increases in healthy

eating and/or decreases in binge eating symptoms might represent meaningful outcomes as well. Also, although weight loss could be achieved by some dieters, it may come with a cost, which may vary as a function of the motives underlying eating regulation. For instance, some individuals might develop excessive concerns with their eating behaviours and weight, that is, drive for thinness (Garner, 1991), while other individuals might increasingly feel exhausted by or "fed up" with their eating regulation efforts. That is, they have the experience that a lot of psychological energy is consumed by their everyday attempts to regulate their eating behaviours. Such experiences of drive for thinness and dietary exhaustion are likely to have an important negative impact on dieters' wellbeing (Pelletier, et al., 2004).

The present study had three goals. A first, descriptive goal was to study the prevalence of motives for eating regulation in a group of individuals who actively try to restrict their eating behaviours. We hypothesized that dieters would, on average, personally value the usefulness of their eating regulation and, thus, would especially display identified motivation. However, given societal pressures to be slender and the negative stigma surrounding overweight and obesity, also high scores for introjected and external motives were expected. This might especially be the case for overweight and obese individuals, who will likely experience the biggest discrepancy between their actual body and the ideal body as portrayed within Western society.

Second, the relations between baseline levels of motives for eating regulation and 18-month changes in weight, healthy eating behaviours, disordered eating symptoms (binge eating symptoms and drive for thinness), and exhaustion were examined. Based on SDT, we formulated the general hypothesis that more autonomous motives would related to increases in adaptive outcomes and decreases in maladaptive outcomes, while the opposite pattern was expected for controlling motives. Different from previous work (e.g., Pelletier & Dion, 2007) which made use of composite

scores for autonomous and controlled motives, we examined the independent contributions of the separate motives. We had especially an interest in the role of introjected regulation, as many dieters are known to put themselves under pressures to attain their diet requirements, and we aimed to examine whether this type of eating regulation would yield unique longitudinal correlates. Also, the distinction between intrinsic and identified motivation seemed critical to us in this context, as many dieters might not find it very enjoyable to stick to their diet, although they do foresee the personal relevance of doing so. Hence, identified regulation may prove to be a more important predictor, as has been found in the domain of politics (Losier & Koestner, 1999). In addition, we investigated whether significant differences in these relationships would emerge according to the weight status of dieters. Because within SDT, the studied motivational processes are assumed to be universally important (Ryan & Deci, 2000), few, if any, structural differences were expected between normal-weight, overweight and obese participants. That is, although overweight, compared to normal-weight, individuals might experience more pressures to regulate their eating behaviours, it is expected that the pressures will have a similar negative effect on eating outcomes in overweight and normal-weight individuals.

The final aim involved examining the explanatory role of diet-specific psychological need satisfaction and need frustration in the relation between dietary motives and eating outcomes. If self-reported dieters personally value their dieting behaviours or when they derive a feeling of enjoyment and personal challenge from it, increases in feelings of autonomy, competence and support are expected to occur. In contrast, if self-reported dieters act upon feelings of shame and guilt or on demands and expectations from others, increases in feelings of pressure, incompetence and tension are hypothesized to emerge. In turn, diet-specific need satisfaction is hypothesized to relate especially to changes in adaptive outcomes (i.e., healthy eating, weight loss), whereas need frustration would especially relate to changes in maladaptive outcomes (i.e., drive for thinness, binge eating

symptoms, and exhaustion (Ng, et al., 2013; Verstuyf, Vansteenkiste, et al., 2012; Verstuyf, et al., 2013). Also, in this case, weight status was explored as a potential moderating variable in these relationships to examine whether need satisfaction and need frustration would yield similar benefits and costs across normal-weight, overweight, and obese participants.

Method

Participants and Procedure

Members of Weight Watchers programs were invited to take part in the study through a letter they received in a weekly gathering. In this letter, members were informed on the general purpose of the study, that is, to investigate their motives for eating regulation and their eating behaviours. They were also informed that they would be contacted through e-mail at a later time point to participate again and a link to the online questionnaire was offered. During their first participation, a unique personal code was generated by the computer. Eighteen months after the first wave, participants received an invitation to participate another time. The personal code, which was needed to sign in for the follow-up participation, was attached to the invitation. Members who did not participate again, received a second and third invitation mail approximately one and two months after the first invitation, as to further encourage them to fill in the online questionnaire.

At Time 1 (T1), 458 members participated, with the age range varying between 17 and 74 years (mean age = 44.54, SD = 12.29; 4.8% male). The majority of the participants was highly educated (54%), followed by a larger group who finished secondary school (32.7%) and a smaller percentage who had only finished primary school (12.9%). The BMI varied from 20.29 to 44.73 (mean BMI = 27.85, SD = 4.69), with 32.8%, 39.7% and 27.5% being classified as normal-weight, overweight, and obese, respectively. At Time 2 (T2), 219 members participated again (47.7%) of which 60% were still involved in the Weight Watchers program. Although quite a large proportion of data were missing, the normed chi-square of

Little's Missing Completely At Random Test (Little, 1988) turned out to be non-significant (normed χ^2 of 1.20; < 2), suggesting that the incomplete data are likely to be missing at random. Under such conditions, Full Information Maximum Likelihood (FIML) is the most appropriate way to deal with the missing data (Enders & Bandalos, 2001). The FIML approach uses information of all cases to compute the parameter estimates.

Measures

Demographic variables. Participants reported their age, gender, educational level, height and weight. Based on self-reported height and weight, BMI was calculated with the formula [weight in kg/(2*length in m)].

Motives for eating regulation. Motives were assessed through the self-regulation questionnaire (SRQ; Levesque et al., 2007; Ryan & Connell, 1989). The SRQ refers to a range of questionnaires which assess domain-specific individual differences in the types of motivation and has been used in several domains (e.g., school, treatment). Each questionnaire asks why the respondent does a specific behaviour on a scale from 1 (*completely disagree)* to 5 *(completely agree)* and then provides several possible reasons that represent the different types of motivation. It must be noted that integrated motivation was not measured due to difficulties in distinguishing between the integrated and identified motives. This is in line with many previous studies (e.g., Guay, Mageau, & Vallerand, 2003). Participants were presented with the sentence "I regulate my eating behaviours because … ", followed by sixteen items which reflect intrinsic (e.g., *"Because I enjoy regulating my eating behaviours"*), identified (e.g., *"Because regulating my eating behaviours fits in with what I find truly important in life"*), introjected (e.g., *"Because only then I can feel good about myself"*) and external motives (e.g., *"Because others would like me more"*). Cronbach's alpha's were .82, .79, .79 and .85 for intrinsic, identified, introjected and external dietary motives respectively.

Diet-specific need satisfaction and frustration. In a previous study (Verstuyf, Vansteenkiste, et al., 2012), a diet-specific measure of need frustration was successfully developed. In the current study, this scale was expanded as to include both diet-specific need satisfaction and frustration, as recent evidence indicates that low need satisfaction does not imply by definition the presence of need frustration (Bartholomew, et al., 2011; Verstuyf, et al., 2013). Four items were developed for each need, of which two referred to need satisfaction and two to need frustration. Participants indicated on a scale from 1 (*completely disagree*) to 5 (*completely agree*) how much they agree with items such as *"I feel free to regulate my eating behaviours the way I want to"* (autonomy satisfaction), *"I feel capable at regulating my eating behaviours"* (competence satisfaction), *"I feel connected to other people when I'm regulating my eating behaviours"* (relatedness satisfaction) and *"I feel like I have no other choice than to regulate my eating behaviours"* (autonomy frustration), *"Regulating my eating behaviours sometimes feels like an impossible task"* (competence frustration) and *"Regulating my eating behaviours is a source of tension with people for whom I care"* (relatedness frustration). Cronbach's alpha's were .71 and .81 at T1 and .78 and .83 at T2 for diet-specific need satisfaction and frustration respectively.

Healthy eating behaviours. To measure healthy eating six items from the Healthy Eating Habits Scale (HEHS; Pelletier & Dion, 2004) were selected. This scale was constructed in collaboration with nutritionist and intents to measure the amount of healthy and unhealthy foods people generally eat. Participants answered on a scale from 1 *(not at all)* to 5 *(a lot)* to items such as *"I eat vegetables"* and *"I eat a variety of foods as recommended in the food pyramid"*. Cronbach's alpha's were .71 and .78 at T1 and T2 respectively.

Drive for thinness and binge eating symptoms. Drive for thinness and binge eating symptoms were assessed with the drive for thinness and bulimia subscales of the Eating Disorder Inventory (EDI; Garner, 1991). All

items were assessed on a scale from 1 (*never*) to 6 (*always*). Drive for thinness refers to an excessive concern with eating, preoccupations with weight and fear of weight-gain. An example item is "*I'm terribly scared to gain weight*". Cronbach's alpha's were .79 and .87 at T1 and T2. The bulimia subscale assesses "the tendencies to think about and engage in bouts of uncontrollable overeating" (Garner, 1991, p. 5). One item was not included in the computation of the scale score (i.e., "*I have thought of trying to vomit in order to lose weight"*) since we were mainly interested in binge eating symptoms rather than compensatory bulimic behaviours (see also Verstuyf, Vansteenkiste, et al., 2012). An example item is "*I have episodes of eating in which I feel like I cannot stop eating*". Cronbach's alpha's were .87 and .89 at T1 and T2.

Dietary exhaustion. For the purpose of the present study, five items were created to assess dietary exhaustion, thereby finding inspiration in a well-validated work burn-out scale (i. e., Schaufeli & Van Dierendocnk, 2000). These items were *"Regulating my eating behaviours is exhausting", "At evenings, I feel exhausted by my attempts to regulate my eating behaviours", "I sometimes have the feeling I get mentally drained by regulating my eating behaviours", "I feel fed up and empty by the thought I have to regulate my eating behaviours",* and, *"Regulating my eating behaviours is arduously".* Cronbach's alpha indicated good reliabilities of .90 at T1 and .89 at T2.

Results

Plan of Analysis

To examine the prevalence of motivational subtypes in the entire sample and the different weight status groups (Aim 1), a series of within-group pairwise *t*-tests were conducted. Within each group, mean scores were compared to the mean scores with the smallest discrepancy. If the smallest discrepancy was significant, it follows that also larger discrepancies are significant. For instance, if a discrepancy of 0.30 (e.g., discrepancy between

introjected and identified regulation) would be significant, it follows that a discrepancy of 2.71 within the same group would be significant as well (e.g., discrepancy between introjected and external regulation). Apart from examining these within-group differences, a MANOVA was conducted to inspect differences in the motivational profile and outcomes between weight status groups and F-tests were used to examine whether discrepancies between motives differed according to one's weight status. To investigate the role of motives (Aim 2) and the explanatory role of need satisfaction and need frustration (Aim 3), a series of structural models using path analyses were performed within MPlus, version 5.1. In each model we controlled for the stability in the constructs (i.e., autoregressive paths) and within-time associations between the constructs. Further, all study variables were regressed on age and gender to avoid confounding effects. Model fit was assessed using the chi-square statistic, the root-mean-square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), and the comparative fit index (CFI). Combined cut-off values of .08 or lower for the RMSEA, and .09 or lower for the SRMR are considered a good model fit (Hu & Bentler, 1999). In addition, a CFI with values of .90 or higher reflects an acceptable fit (Bentler, 1990). To examine whether the tested models would hold across weight groups, we compared a model in which the structural paths were set equal with a model in which structural paths were set free across the three weight groups. Difference in chi-square was used to test whether the model could be considered invariant or significantly different across the three weight groups.

Preliminary Analyses

Table 2 presents correlations among the study variables at both waves. With increasing age, participants reported more identified and less external motives at T1 and reported more healthy eating behaviours and less binge eating symptoms at T2. Further, an inspection of the correlates between the motives for eating regulation and outcomes assessed at both T1

and T2 revealed that more autonomous motives correlated positively with desirable outcomes (e.g., healthy eating behaviours) and negatively with undesirable outcomes (e.g., drive for thinness), while controlling motives tended to yield the opposite pattern of correlates. Further, need satisfaction and need frustration were related differentially to outcomes at both waves, with need satisfaction being positively related to desirable outcomes and negatively to undesirable outcomes and need frustration yielding the opposite pattern of correlates. Finally, the rank order stability in the outcomes across both waves was substantial, varying between .65 and .88.

Next, a Multivariate Analysis of Variance (MANOVA) was performed with gender and educational level as independent variables and the study variables as dependent variables, revealing a significant multivariate effect of gender [$F(10, 187) = 1.822$, $p = .05$)] but not of educational level [$F(70, 1097) = 0.96$, *ns*)]. Female participants scored significantly higher on identified motivation ($M = 5.19$, SD = 1.00 ; $F(1, 196) = 5.02$, $p < .05$) compared to male participants ($M = 4.58$, $SD = 1.18$). No other gender differences reached significance. Given the significant associations between age and gender and various study variables, we included them as covariates in further analyses.

Primary Analyses

Aim 1: Prevalence of different types of eating regulation motives. To examine the prevalence of motivational regulations in the entire sample, we began with performing a series of within-group paired sample *t*-tests (see Table 3). In the total group, introjected motivation was most prevalent and was more strongly endorsed than each of the other subtypes. Identified motivation was the second most important motive and appeared to be more strongly endorsed than both intrinsic and external motives. Finally, external regulation was the least endorsed motive. These analyses were repeated within each of the three subgroups to examine whether differences between motivational subtypes would be (dis)similar. The pattern of means

in all three groups was similar to the observed pattern in the entire sample, with one exception: introjected and identified motivation were endorsed equally in the normal-weight group, while introjected motives were endorsed more strongly in both the overweight and obese group of individuals.

Next, to examine between-group (rather than within-group) differences in motivational regulations, a MANCOVA was performed, yielding a significant multivariate effect, F (8, 880) = 3.14, p = .01. The means can be found in Table 3. Post-hoc analyses revealed that normal-weight participants displayed significant higher levels of identified motivation compared to overweight participants, which scored significantly higher than obese participants. In addition, a significant difference between weight groups emerged for external regulation, F (2,443) = 3.30, p = .05, with normal-weight individuals scoring lower on external regulation compared to overweight and obese participants.

Aim 2: Eating regulation motives as predictors of eating outcomes. A direct effect model allowed investigating longitudinal associations between each of the four dietary motives at T1 and the five outcomes at T2, thereby controlling for baseline levels in these outcomes. Direct paths were allowed between all motivational subtypes and all outcomes at T2. The fit of this model was good: $\chi^2_{(106)}$ = 164.67, p < .001, RMSEA = 0.06, CFI = 0.97 and SRMR = 0.07. Subsequently, we tested a model in which structural paths were set equal across the three weight groups rather than being allowed to vary. Doing so did not result in a significant deterioration of the model, $\Delta\ \chi^2_{(40)}$ = 52.05, *ns*, indicating the overall model held across the three weight groups. Specifically, intrinsic motivation at T1 was associated with decreases in BMI (β = -.26, p < .01), dietary exhaustion (β = -.20, p < .05) and drive for thinness (β = -.10, p = .06, albeit only marginally), while it related positively to increases in healthy eating behaviours (β = .19, p < .05). Next, the other autonomous form of regulation, that is, identified regulation, related to decreases in binge eating symptoms (β = -.11, p < .05) and dietary exhaustion (β = -.14, p < .05). This

pattern of findings stood in contrast to the findings observed for the two controlled motives. Specifically, introjected regulation at T1 was associated with increases in BMI (β = .19, p < .05), drive for thinness (β = .17, p < .01) and dietary exhaustion (β = .10, p = .08, albeit marginally), whereas external regulation related to increases in both binge eating symptoms (β = .11, p < .05) and drive for thinness (β = .11, p < .05).

Aim 3: Psychological need satisfaction and need frustration as mediators between eating regulation motives and outcomes. To investigate the mediating role of diet-specific need satisfaction and need frustration, a model was constructed with paths from the dietary motives at T1 to need satisfaction and frustration at T2, thereby controlling for baseline levels, and further allowing paths from changes in need satisfaction and need frustration to outcomes at T2, thereby controlling for baseline differences in these outcomes. This model yielded an unacceptable fit; $\chi^2_{(198)}$ = 569.86, p < .001, RMSEA = 0.11, CFI = 0.87 and SRMR = 0.13. Next, a model in which structural paths were set equal across weight groups did not produce a deterioration in fit compared to a model in which paths were set free ($\Delta\ \chi^2_{(36)}$ = 47.76, *ns*), indicating that the observed model held up across the three weight groups. Both intrinsic and identified motivation were uniquely related to increases in diet-specific need satisfaction (β = .29 and .13 respectively, both p <.05), with increases in need satisfaction, in turn, relating to decreases in BMI (β = -.21, p < .01) and dietary exhaustion (β = -.35, p < .001) and increases in healthy eating behaviours (β = .18, p < .05). Further, through Sobel tests significant indirect paths emerged from intrinsic motivation through need satisfaction to healthy eating behaviours (β = .05, p < .05), dietary exhaustion (β = -.13, p < .01) and BMI (β = -.06, p < .05). In addition, a significant indirect path was found from identified motivation through need satisfaction to dietary exhaustion (β = -.08, p < .05) and to healthy eating behaviours (β = .07, p = .07) and BMI (β = -.03, p = .09), although the latter two indirect paths were only marginally significant.

As for the role of need frustration, against expectations, no significant relationships were found between dietary motives at T1 and changes in diet-specific need frustration. Yet, increases in need frustration were associated with concurrent increases in binge eating symptoms (β = .26, p < .001), drive for thinness (β = .25, p < .001) and dietary exhaustion (β = .34, p < .001). Given the lack of effects from the dietary motives on changes in need frustration, no indirect paths through need frustration were tested.

In the final model, direct paths from the motives to the outcomes which were found significant in the direct effect model were added. Further, only significant mediating relationships were kept in the model, such that need frustration was removed from the final model. The fit of this final model was acceptable; $\chi^2_{(167)}$ = 287.808, p < .001, RMSEA = 0.07, CFI = 0.95 and SRMR = 0.07. The constrained model in which structural paths were set equal across weight groups resulted in a similar fit compared to a model in which structural paths were allowed to vary across weight groups ($\Delta\chi^2_{(32)}$ = 36.68, *ns*), indicating that the final model (see Figure 1) can be equally applied to normal-weight, overweight, and obese participants. In this model, intrinsic motivation at T1 yielded a direct effect upon decreases in BMI and drive for thinness and a significant indirect effect via need satisfaction on changes in dietary exhaustion (β = -.05, p < .001), BMI (β = -.05, p = .07) and healthy eating behaviours (β = .01, p = .09), although the latter two indirect effects were only marginally significant. Further, identified motivation at T1 yielded a direct association with decreases in binge eating symptoms. Because the association between identified motivation and increases in need satisfaction became marginally significant in the final model, the indirect effects through need satisfaction became non-significant for BMI and healthy eating behaviours and only reached marginal significance for dietary exhaustion (β = -.03, p = .08). As in the first model, introjected motivation at T1 predicted increases in BMI, drive for thinness

and dietary exhaustion at T2 and external motivation at T1 predicted increases in binge eating symptoms and drive for thinness at T2.

Discussion

Although many studies have been conducted to investigate potential benefits and pitfalls of dieting behaviours, it remains rather unclear whether eating regulation should be recommended or discouraged (e.g., Groesz & Stice, 2007). In line with recent theories on eating regulation (e.g., Stroebe, et al., 2013), the current study aimed at detecting factors and processes that could explain both adaptive and dysfunctional outcomes associated with eating regulation. Specifically, grounded in Self-determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), the type of motives underlying dieters' eating regulation efforts and their validity in predicting changes in weight, healthy eating behaviours, disordered eating symptoms and dieting exhaustion were investigated in a large and heterogeneous sample of individuals following a Weight Watchers program.

Motivational Profiles of Dieters

A first aim of the present study was to shed light on the motivational profile of dieters, thereby inspecting a variety of pressuring and more voluntary motives for eating regulation. Overall, dieters reported that introjected motives were the most predominant motive of their eating regulation efforts. That is, they indicated they regulate their eating behaviours primarily to meet internal pressures, such as the avoidance of feelings of shame and guilt or the pursuit of a contingent sense of pride and self-esteem. Presumably, individuals who regulate their eating behaviours hinge their self-esteem upon their dieting success, thereby feeling more satisfied with themselves if they manage to stick to their diet, whereas self-critical thoughts emerge if they deviate from their diet. This form of regulation was even more salient than the self-ascribed importance of eating regulation (i.e., identified motivation) as such among overweight and obese

participants. The strong presence of internal pressures to regulate eating behaviours is perhaps not surprising in light of the widespread messages in Western society that being in control of one's weight equals success and promotes self-esteem and well-being (Dittmar, 2007; Evans, 2003; Ogden, 2010). Also, at least some health counsellors may encourage individuals to engage in a process of self-reward, such that they can choose a material reward or "applaud" for themselves if they manage to stick to their diet, a motivational strategy that may lead dieters to more strongly attach their self-esteem and ego to their dieting success and failure.

Interestingly, the other form of pressure, that is pressures coming from external sources were least strongly endorsed. This means that most dieters do not feel pressured by others, such as their spouse, family members, health care providers or broader society to stick to a diet. Perhaps, these external pressures are more salient among young-adolescent dieters, but over the years individuals might have "taken in" the message that they can only feel good and confident about themselves if they are in control of their weight and eating behaviours. Although the motive for eating regulation resides within the individual in the case of introjected regulation, the contingent sense of self-esteem that is attached to this form of regulation may come with certain costs, as discussed in greater detail below.

Apart from the salience of these internally pressuring motives, dieters also had more autonomous motives for eating regulation, that is, they tend to personally value the advantages associated with eating regulation (i.e., identified regulation) and, to a lesser extent, also enjoy their eating regulation (i.e., intrinsic motivation). Indeed, dieters might have personally experienced the benefits of regulating their eating behaviours and weight in terms of other life goals. For instance, they may have found out that a healthy lifestyle provides them more energy to take up and persevere at important activities, such as parenting (e.g., taking care for and playing with children), or at enjoyable activities (e.g., going out for dancing or doing sports together). In line with the idea that the shift away from external to

more voluntary motives may require some experience and time, age was found to relate positively to identified and negatively to externally pressuring motives, a finding consistent with other life domains (e.g., Sheldon & Kasser, 2001).

As for the difference between weight status groups, overweight and obese dieters reported more external and less identified motivation for eating regulation. This implies that these individuals experienced more external pressures to stick to a diet and they saw less the value and benefit of their dieting behaviours compared to normal-weight participants. Possibly, the stigmatization surrounding overweight and obesity (Ogden, 2010), affects overweight and obese individuals such that they develop a less desirable motivational profile compared to normal-weight participants.

The Type of Motivation Matters: Relations with Individuals' Experiences and Eating Behaviours

Although it is appealing to believe that the presence of any form of motivation to regulate eating behaviours among overweight and obese persons is desirable and better than the lack of motivation, the present findings suggest that the type of motivation matters. Indeed, not all types of motives underlying eating regulation yielded desirable outcomes, which can help to explain the differential outcomes associated with eating regulation found in previous research. As for weight loss, which is often the primary outcome researchers used to evaluate the effectiveness of dieting behaviours (Mann, et al., 2007), only dieters who indicated they enjoy regulating their eating behaviours were more likely to lose weight on the long run. These findings are consistent with the observed positive effect of autonomous motives on weight loss in severely obese adults (Williams et al., 1996) and the importance of autonomy in sustained weight loss (Elfhag & Rossner, 2005; Teixeira, Going, Sardinha, & Lohman, 2005). Along similar lines, only intrinsic motivation predicted increases in healthy eating behaviours on the long run. These findings are important, especially given that intrinsic

motivation was endorsed relatively weak compared to the other forms of regulation. The findings extend previous correlational work (e.g., Pelletier & Dion, 2007) by showing that more autonomous motives not only concurrently predict healthy eating behaviours, but also yield significant increases over time.

Further, both autonomous motives for eating regulation were found to have a buffering or protective role in relation to disordered eating symptoms. Previous studies indicated dieting behaviours might also come at a cost, that is, dieters are at increased risk of losing control over eating and developing binge eating symptoms (Stice, Mazotti, Krebs, & Martin, 1998; Stice, Presnell, & Spangler, 2002; Westerberg-Jacobson, et al., 2012). In the current study, we expanded on potential maladaptive outcomes of eating regulation by including also measures of drive for thinness and dietary exhaustion. In general, more autonomous motives were associated with decreases in these maladaptive outcomes, with intrinsic motivation relating to decreases in excessive concerns and dietary exhaustion and identified motivation relating to decreases in binge eating symptoms and dietary exhaustion. Together then, intrinsic motivation was found to be an important predictor of more adaptive and less dysfunctional outcomes, whereas identified regulation was a predictor of less dysfunctional outcomes.

The pattern of outcomes associated with pressuring motives was strikingly different. First, dieters reporting introjected motives were more likely to gain weight on the long run. Second, both types of pressuring motives were associated with increases in maladaptive outcomes, with introjected motives being associated with increases in drive for thinness and dietary exhaustion and external motives being associated with increases in binge eating symptoms and drive for thinness. Apparently, controlled motives for eating regulation fail to yield into any adaptive eating and weight changes over time. In contrast, external pressures to regulate eating behaviours yield into increases in binge eating symptoms and excessive concerns over eating. Dieters who are put externally under pressure might

try to regulate their eating behaviours when others are present, but give in to their urges to eat when others are no longer present. In line with this, the presence of others has been found to suppress uncontrolled eating in restrained eaters (Herman, Roth, & Polivy, 2003) which might be especially true for externally regulated dieters. However, not only external pressures, but also internal pressures yielded a considerable cost. As the ego of introjected dieters is hooked upon the success ratio of their diet, they are more at risk for developing excessive concerns with eating and weight. Unfortunately, rather than being associated with weight loss, the stronger presence of introjected motives related to weight gain on the long run and increasingly engendered feelings of exhaustion. Individuals high on introjected regulation became tired and fed up with their dieting behaviours, perhaps because of the lack of success they experience. Possibly, these dieters engage in the typical "all-or-nothing diets" in which they alternate between episodes of rigid dieting and episodes of giving up any attempt to regulate their eating behaviours (Polivy & Herman, 1985). The current findings are quite alarming, given that dieters indicated internal pressures were their primary source of motivation. Overall then, the pattern of results indicate that the same behaviour (i.e., eating regulation) can yield both adaptive or dysfunctional outcomes depending upon the underlying motives. These findings help to unravel, at least partially, the dietary mystery identified in past research, that is, the observation that dieting yields mixed findings.

The Process of Diet-specific Need satisfaction and Need Frustration

It is not only important to understand when eating regulation is more likely to succeed or fail, but also to capture the processes that can explain why they succeed or fail. In the current study, diet-specific need satisfaction and frustration were examined as potential mediating processes between dietary motives and outcomes. In line with previous studies (e.g., Bartholomew, et. al., 2011; Thogerson-Ntoumani et al., 2011; Verstuyf, et.

al., 2012, 2013), changes in need satisfaction were associated with changes in BMI, healthy eating behaviours and dietary exhaustion, whereas changes in need frustration were associated with changes in drive for thinness, binge eating symptoms, and dietary exhaustion. Thus, dieters who gain a sense of volition, competence and relational connectedness with respect to their eating regulation are also more likely to lose weight and eat healthy without feeling tired or exhausted by their efforts. In contrast, if dieters develop feelings of pressure, ineffectiveness, and relational tension regarding their eating regulation, they also report feeling fed up by their diet, expressed excessive concerns with their eating behaviours and weight and were more at risk for experiencing binge eating symptoms.

Although diet-specific need satisfaction and frustration was implicated in the success versus failure of eating regulation, their presumed explanatory role was only partially confirmed. That is, both intrinsic and identified motives predicted increases in need satisfaction, yet external and introjected motives did not predict increases in need frustration, such that need frustration was excluded from the final integrated process model. In this final model, need satisfaction appeared to play a partially explanatory role in the association between autonomous motives and changes in weight and healthy eating behaviours, while fully accounting for the path between intrinsic motivation and dietary exhaustion. In other words, dieters who enjoy regulating their eating behaviours feel less exhausted by their dieting behaviours because they gain a sense of need satisfaction over time. More research is needed to capture the process through which dietary motives have an impact on dietary outcomes more thoroughly. For instance, future studies could investigate whether the form of eating regulation (e.g., Groesz & Stice, 2007; Strong & Huon, 1999) or the approach towards eating regulation (Otis & Pelletier, 2008) can help to explain the association between motives for eating regulation and both adaptive and dysfunctional outcomes associated with eating regulation.

Limitations and Suggestions for Future Research

It must be noted that there are some important limitations. First, a substantial percentage of participants dropped out of the study, a phenomenon which is difficult to avoid when measurement waves are situated far apart. The exclusive reliance on e-mail to contact participants explains the drop-out rate as we had no alternatives available to contact participants through different channels. Yet, missing value analyses did reveal the data were missing at random, indicating no systematic differences in the observed values at time one were found between participants who participated again and those who dropped out. Therefore, it is probable that the same pattern would have been found if the entire group would have participated again.

Second, the percentage of participating men was limited. It would have been interesting to investigate gender differences more thoroughly. Different gender roles are assigned to males and females, which might result in different motives underlying eating regulation.

Third, all measures were self-reported, which might be problematic for BMI and healthy eating behaviours. Indeed, previous studies indicated persons in general tend to underreport their weight which leads to an overestimation of the effectiveness of dieting behaviours (Mann, et. al., 2007). As for healthy eating behaviours, it might be difficult for persons to evaluate whether they eat a lot of vegetables or fruits. Perhaps intrinsically motivated persons tend to overestimate the amount of healthy foods eaten. Future studies could measure healthy eating behaviours by limiting the time frame between eating and assessment, for instance, in a diary study. Biological markers or observation of healthy eating behaviours would have added to the strength of this study. The limitation of self-report might be less problematic given that the purpose of this study was to investigate relative changes in weight and healthy eating behaviours rather than the exact amount of weight loss and healthy eating behaviours.

Finally, future studies could look into the dynamic interplay between motivation and eating behaviours, by investigating reciprocal effects over time. Perhaps, eating behaviours can also yield into changes in motivation. For instance, dieters who experience binge eating symptoms, might over time develop a more introjected motivational style of dieting. Further, in the domain of physical activity, a so-called "spill-over" effect was found of motivation. Increasing autonomous motivation for exercise improved eating behaviours over a 12-month period, indicating that stimulating autonomous regulation for a specific health behaviour is more likely to spontaneously generalize to other health behaviours (Mata, et al., 2009). It would be interesting to investigate whether autonomous motivation for eating regulation would also translate into other health behaviours, such as physical activity. A final suggestion for future studies would be to include both the motives and the goals for eating regulation (e.g., Verstuyf, Vansteenkiste, et al., 2012). Dieters who focus on appearance rather than health, might be more vulnerable to develop problematic eating behaviours over time.

Clinical Implications

Future studies are needed to further investigate and replicate the role of motivation on changes in weight, healthy eating behaviours, disordered eating symptoms and dieting exhaustion. However, some preliminary suggestions for health care providers can already be provided based on results of the current study. First, it seems important to reflect on the motives underlying the individuals' goal of losing weight. The aim of this motivational perspective would be to become aware and move away from external and internal pressures for dieting behaviours and to reflect thoroughly whether eating regulation would be helpful to achieve important goals in life or a sense of enjoyment and challenge. If eating regulation is not embedded within personal meaningful values or personal enjoyment and challenge, it might be better for persons to not start regulating their eating behaviours at all. In other words, behaviour change might not be the most

important outcome of a motivational phase, but rather a thorough reflection on the value of eating regulation (Ryan, Lynch, Vansteenkiste, & Deci, 2011).

Further, although there was little evidence for a mediating role of need satisfaction and frustration, changes herein were strongly associated with changes in both adaptive and dysfunctional outcomes. Therefore, it might be meaningful for health care providers to create a context in which need satisfying experiences are more likely to occur and chances on need frustration experiences are minimized. First, autonomy could be stimulated by collaborating together on which changes could be strived for and to focus on behaviour change that fits in with the persons' lifestyle rather than that the health care provider advices the person on what he or she should change. For instance, if a dieter feels respected for her choice not to change her habit of drinking a glass of wine each evening, she might feel more autonomous in changing other behaviours. Second, a growing feeling of competence could be achieved by helping the person to set up behaviour change gradually. Behaviour change goals should be challenging, but at the same time achievable such that the persons comes to experience their own capability of change. Third, by providing unconditional support and by being attentive to the person him- or herself rather than focusing on behaviour change only, a sense of relatedness and support can grow. By creating these circumstances, more successful eating outcomes are likely to occur, whereas the chances on problematic changes are minimized.

Finally, it seems important to investigate the impact of therapeutic interventions on the types of motivation dieters display. For instance, financial incentives have been used increasingly to stimulate behaviour change in overweight individuals (e.g., Burns et al., 2012). The use of rewards is, from the perspective of SDT, a form of external regulation. Therefore, it would only relate to temporal, rather than sustained, behaviour change (Deci & Ryan, 2000). In line with this, review studies found no long term benefits of financial incentives on weight loss (Paul-Ebhohimhen &

Avenell, 2008). Importantly, within SDT, external rewards were also found to have an undermining effect in behaviours which were autonomously motivated at baseline (Deci, Koestner, & Ryan, 1999). Therefore, the use of financial incentives might not only be ineffective but also work against sustained weight loss. In line with this hypothesis, Moller and colleagues (Moller, Buscemi, McFadden, Hedeker, & Spring, 2013; Moller, McFadden, Hedeker, & Spring, 2012) found that participants who attach great importance to financial incentives, compared to participants who attach little or no importance to financial incentives, in an intensive diet and exercise intervention, lose less weight and display less healthy eating behaviours during the intervention and maintenance phase. Importantly, whereas participants who did not attach importance to the financial incentives increasingly enjoyed eating healthy foods and engaging in physical exercise and decreasingly enjoyed eating high-saturated foods, participants who attached great importance to the financial incentives did not change in their enjoyment. Therefore, these authors concluded that the use of financial incentives undermine the potential for growing into enjoying a healthy lifestyle and disliking unhealthy foods. Future studies could further investigate the interplay between financial incentives and motivation, thereby possibly comparing motivational interventions aimed at increasing external regulation (i.e., financial incentives) to motivational interventions aimed at increasing more autonomous forms of motivations, such as Motivational Interviewing (Miller & Rollnick, 2002).

Conclusion

Should eating regulation be encouraged or not? Based on the current study, the answer would be that a thorough reflection on the personal values and enjoyment of eating regulation should be encouraged, whereas persons could be guided into dealing differently with internal and external pressures to regulate eating behaviours. Indeed, eating regulation was found to be meaningful and adaptive if embedded in personal values and enjoyment.

Otherwise, if motivated by external or internal pressures, problematic behaviours were found to increase over time. Future research may shed light greater attention to the role of introjected motivation, which was found to be the most prevalent motivate, especially in overweight and obese dieters, yet, this motive did not yield any desirable changes over time. Also, intrinsic motivation was relatively less endorsed, but turned out to be a stronger predictor of adaptive change and less problematic behaviours and experiences. Overall then, the results of the current study indicate that the motivational framework of SDT can shed insight in the factors and processes that explain when and why eating regulation is successful versus problematic.

Table 1

Overview of subtypes of motivation

	External regulation	**Introjected regulation**	**Identified regulation**	**Integrated regulation**	**Intrinsic regulation**
Extrinsic/Intrinsic	Extrinsic	Extrinsic	Extrinsic	Extrinsic	Intrinsic
Controlled/Autonomous	Controlled	Controlled	Autonomous	Autonomous	Autonomous
Characteristics	External pressures	Internal pressures	Willingness, volition	Willingness, volition	Enjoyment, volition
Internalization continuüm	→	→	→	→	No need for internalization

Table 2.

Correlations among the measured variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1											
2. Intrinsic motivation (T1)	.05	1										
3. Identified regulation (T1)	.10*	.54**	1									
4. Introjected regulation(T1)	-.03	.34**	.38**	1								
5. External regulation (T1)	-.17**	12**	-.03	.28**	1							
6. Need satisfaction (T1)	.11*	.50**	.44**	.20**	-.09	1						
7. Need frustration (T1)	-.11*	-.24**	-.27**	.08	.39**	-.51**	1					
8. BMI (T1)	.04	-.12*	-.20**	-.07	.07	-.20**	.34**	1				
9. Healthy eating (T1)	.10*	.19*	.35**	.19*	-.05	.38**	-.28**	-.20**	1			
10. Binge eating (T1)	-.22**	-.23**	-.20**	.14**	.31**	-.40**	.52**	.28**	-.10*	1		
11. Drive for thinness (T1)	-.04	-.01	-.05	.38**	.35**	-.11*	.41**	.12*	-.07	.37**	1	
12. Dieting exhaustion (T1)	-.14*	-.44**	-.36**	-.11*	.25**	-.64**	.66**	.16*	-.33**	.45**	.26**	1
13. Need satisfaction (T2)	.13	.50**	.40**	.17*	.01	.65**	-.46**	-.16*	.35**	-.36**	-.18*	-.52**
14. Need frustration (T2)	-.05	-.26**	-.25**	.02	.28**	-.52**	.65**	.32**	-.23**	.54**	.44**	.56**
15. BMI (T2)	.04	-.23**	-.10	-.04	.03	-.20**	.32**	.88**	-.19*	.32**	.08	.19*
16. Healthy eating (T2)	.23**	.30**	.34**	.14*	.00	.28*	-.20**	-.13	.67**	-.16*	.01	-.27*
17. Binge eating (T2)	-.17*	-.25**	-.19**	.16*	.22*	-.32**	.40**	.23**	-.07*	.81**	.46**	.28**
18. Drive for thinness (T2)	.02	-.14*	-.12	.37**	.33**	-.23**	.41**	.08	.03	.50**	.74**	.24*
19. Dieting exhaustion (T2)	-.08	-.49**	-.34**	-.07	.13^{+}	-.54**	.52**	.25**	-.40**	.40**	.33**	.65**

Note. * $p < .05$, ** $p < .01$

Table 2 *(continued)*

	13	14	15	16	17	18
13. Need satisfaction (T2)	1					
14. Need frustration (T2)	-.66**	1				
15. BMI (T2)	-.22**	.36**	1			
16. Healthy eating (T2)	.44**	-.30**	-.16*	1		
17. Binge eating (T2)	-.41**	.60**	.35**	-.25**	1	
18. Drive for thinness (T2)	-.29**	.54**	.12^{+}	-.09	.63**	1
19. Dieting exhaustion (T2)	-.73**	.75**	.28**	-.47**	.46**	.38**

Table 3

Means, standard deviations, between-group F-tests and within-group paired t-tests

	General	Normal-weight	Overweight	Obese	*F* (2, 447)
	N = 460	N = 148	N = 179	N =124	
Intrinsic motivation	4.12 (1.2934)	4.32 (1.33)	4.13 (1.30)	3.88 (1.21)	0.73
Identified motivation	5.10 (1.14)	5.36 (1.07)	5.12 (1.15)	4.78 (1.15)	6.76**
Introjected motivation	5.41 (1.16)	5.44 (1.20)	5.50 (1.09)	5.26 (1.23)	2.14
External motivation	2.70 (1.21)	2.55 (1.09)	2.78 (1.24)	2.80 (1.29)	3.72*
t-test introjected vs. identified	*M* = 0.30 (1.28)	*M* = 0.09 (1.29)	*M* = 0.38 (1.19)	*M* = 0.48 (1.40)	3.73*
	$t_{(457)}$= 5.04;	$t_{(146)}$= 0.80;	$t_{(178)}$= 4.40;	$t_{(123)}$= 9.05;	
	p < .001	*ns*	*p* < .001	*p* < .001	
t-test identified vs. intrinsic	*M* = 0.98 (1.18)	*M* = 1.04 (1.26)	*M* = 0.99 (1.17)	*M* = 0.90 (1.11)	0.49
	$t_{(457)}$= 17.74;	$t_{(146)}$= 10.01;	$t_{(178)}$= 11.32;	$t_{(123)}$= 9.05;	
	p < .001	*p* < .001	*p* < .001	*p* < .001	
t-test intrinsic vs. external	*M* = 1.42 (1.67)	*M* = 1.77 (1.59)	*M* = 1.35 (1.73)	*M* = 1.07 (1.61)	6.17**
	$t_{(457)}$= 18.22;	$t_{(146)}$= 13.49;	$t_{(178)}$= 10.46;	$t_{(123)}$= 7.44;	
	p < .001	*p* < .001	*p* < .001	*p* < .001	

Note. Paired t-tests were only performed between subtypes of motivation with the smallest discrepancies in mean scores. If significant, it follows that larger discrepancies are significant as well. * $p < .05$, ** $p < .01$.

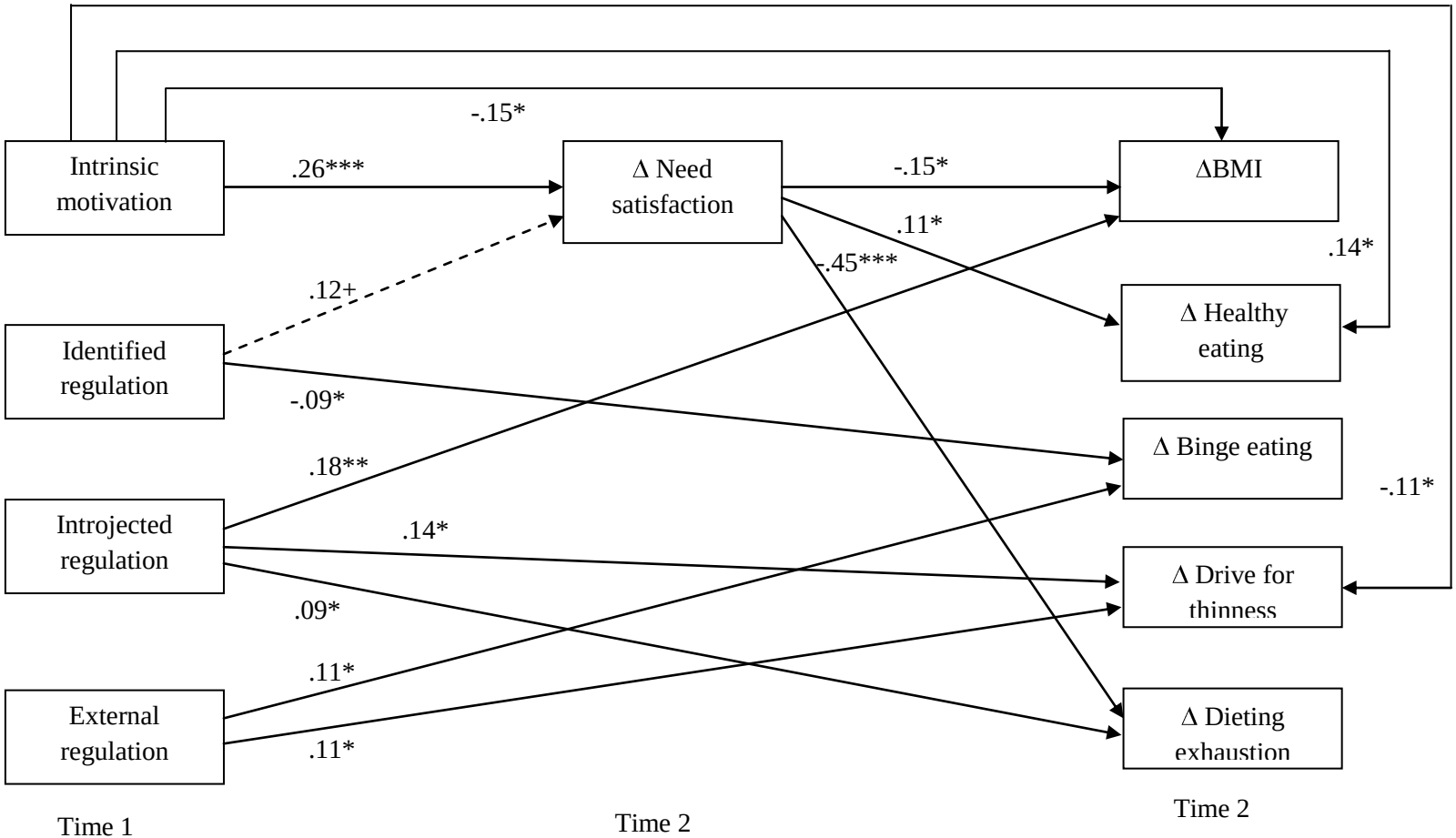

Figure 1. Final model with dietary motives predicting changes in need satisfaction and outcomes. Autoregressive paths, paths from gender and age and within-time correlations are not presented for purpose of clarity.

Chapter 5

The "What" and "Why" of Eating Regulation in Young and Adult Female Dieters: Relationships with Healthy Eating Behaviours and Disordered Eating Symptoms[1]

Although eating regulation is prevalent among women in Western society, research suggests that it is often unsuccessful or even backfires into disordered eating. This study aimed to investigate whether the type of goals and motives underlying individuals' eating regulation are associated differentially with their daily diet-specific need frustration, healthy eating behaviours, and disordered eating symptoms (i.e., drive for thinness and binge eating symptoms). Participants were 99 late adolescent female dieters (Mean age = 18.94) and 98 adult female dieters (Mean age = 45.06), 23.6% of which were overweight. Prior to a 7-day diary assessment of need frustration and eating behaviours, motives and goals for eating regulation were assessed. Results indicated that appearance-focused and controlled eating regulation was positively related to disordered eating symptoms throughout the week. In contrast, autonomous and health-focused eating regulation was associated positively with healthy eating behaviours but was not or negatively related to disordered eating symptoms. Diet-specific need frustration played an intervening role in the relationship between goals and motives and eating behaviours, although some direct relations were maintained as well. These associations were similar for late adolescent and adult dieters, although differences were found in mean levels. These results suggest that the quality of motivation can explain at least partially when and why eating regulation relates to healthy and disordered eating symptoms.

[1] Verstuyf, J., Vansteenkiste, M., Soetens, B., & Soenens, B. (2014). The "What" and "Why" of eating regulation in young and adult female dieters: Relationships with healthy eating behaviours and disordered eating symptoms. *Unpublished manuscript.*

Introduction

Eating regulation plays a central role in the lives of many women. Approximately 50% of adult women engage in eating regulation to lose weight and an additional 34% regulates eating behaviours to maintain weight (Ryan & Deci, 2000; Serdula et al., 1999). Although overweight and obese women are much more likely to engage in eating regulation, also about 30% of normal-weight women report trying to lose weight (Serdula, et al., 1999). Research evidence suggests that eating regulation is not as effective as is generally believed. For instance, dieting interventions, aimed at weight loss, are effective in the short-term but fail to promote sustained weight loss (Mann et al., 2007; Wooley & Garner, 1991). Further, dieting behaviours might even have ironic effects. That is, longitudinal studies indicate that self-declared dieters, over time, are at risk for developing binge eating symptoms (Stice, Davis, Miller, & Marti, 2008; Stice, Presnell, & Spangler, 2002) and might gain more weight compared to their non-dieting peers (Westerberg-Jacobson, Edlund, & Ghaderi, 2010).

In contrast to these pessimistic results, it seems that some dieters do succeed at successfully losing weight for a significant amount of time (Wing & Hill, 2001) and experimental studies indicate that dieting interventions can decrease binge eating in overweight (Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998; Reeves et al., 2001) and normal-weight women (Stice, Presnell, Groesz, & Shaw, 2005). Given the high prevalence of eating regulation and the search for effective eating regulation interventions among overweight individuals (Mann, et al., 2007), it is important to gain insight in the processes that help explain when and why eating regulation is (un)successful.

One critical factor that may explain successful and unsuccessful eating regulation involves the type of motivation underlying eating regulation (Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012). Accordingly, the general aim of the current study was to investigate whether the type of motivation for eating regulation, as conceived from the Self-

Determination Theory perspective (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000), is differentially related to healthy eating behaviours and disordered eating symptoms (binge eating symptoms and drive for thinness) in a group of late adolescent and adult women who declared they were currently on a diet.

Beyond Amount of Motivation: Looking at Different Types of Motivation

SDT is a broad-band motivational theory on human functioning and well-being that has been under development for more than four decades (Deci & Ryan, 2000; Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). Two different types of motivational dynamics have received attention in the theory, that is, (a) the type of goals individuals set for themselves and aspire in their lives, representing the direction or "*What*" of behaviour and, (b) the motives individuals have for engaging in particular activities, representing the regulation or "*Why*" of behaviour. Both aspects of motivation are directly relevant for eating regulation.

"What" of eating regulation. Clearly, self-declared dieters differ substantially in the types of goals they aim to achieve by their eating regulation, with some of them pursuing a perfect and attractive body or social approval and others pursuing a healthier lifestyle. Indeed, in Western society beauty is often equated with thinness (Evans, 2003; Ogden, 2010). Exposure to images depicting the thin-ideal can lead girls and women to feel dissatisfied with their body and to desire losing weight, even if they are in fact normal-weight (Groesz, Levine, & Murnen, 2002). On the other hand, being overweight has substantial medical risks, amongst which a higher risk for cardiovascular diseases, metabolic syndrome and certain types of cancer (Haslam & James, 2005; Yusuf et al., 2005). Therefore, many individuals might engage in eating regulation to maintain or attain a healthier weight and fitness.

The distinction between health-focused and appearance-focused eating regulation is in line with the differentiation between goals with an intrinsic and extrinsic focus within SDT (Kasser & Ryan, 1993, 1996; Vansteenkiste, Soenens, & Duriez, 2008). Extrinsic goals are characterized by an outward orientation towards outcomes such as a desirable image, wealth, fame, and power. In contrast, intrinsic goals, such as health, community contribution, and individual development, are characterized by an inward orientation. Pursuing these goals would be more inherently satisfying (Vansteenkiste, et al., 2008). Consistent with these claims, intrinsic, relative to extrinsic goal pursuit, has been found to be more inherently enjoyable (e.g., Sebire, Standage, & Vansteenkiste, 2009) and to have positive effects on general wellbeing (e.g., Deci & Ryan, 2000; Van Hiel & Vansteenkiste, 2009) and behavioural persistence in domains as diverse as physical activity (e.g., Sebire, Standage, & Vansteenkiste, 2011), education (e.g., Vansteenkiste, Lens, & Deci, 2006) and health care (e.g., Niemiec, Ryan, & Deci, 2009).

Specifically in the domain of eating regulation, appearance-focused, relative to health-focused, eating regulation has been found to relate to less optimal outcomes. In a sample of adult female dieters, Putterman and Linden (2004) found that appearance-focused dieters were more likely to use drastic dieting strategies (e.g., fasting) and to lose control over eating, while such behaviours were not reported by health-focused dieters. Further, in a sample of female adolescents, Verstuyf, Vansteenkiste and Soenens (2012) found that appearance-focused (but not health-focused) eating regulation was related positively to binge eating symptoms. Together, these cross-sectional studies suggest that a focus on appearance underlying eating regulation can explain, at least partially, when eating regulation yields adverse outcomes.

"Why" of eating regulation. Apart from standing in the service of different goal-contents, eating regulation can also be undergirded or regulated by different motives. Some dieters might choose to regulate their eating behaviours because they are deeply convinced of the individual

relevance and importance of doing so, while others feel pressured to do so either from within or by others, such as their peers, parents or the media (e.g., Keery, Boutelle, van den Berg, & Thompson, 2005; McCabe et al., 2007). To capture these different types of motivation, in SDT a distinction is made between controlled or pressured and autonomous or volitional motives (Deci & Ryan, 2000). Controlled motives stem from pressures that originate from without (i.e., external regulation) or from within (i.e., introjected regulation). Indeed, some individuals regulate eating behaviours to please others, to avoid criticism, or to obtain rewards which were made contingent upon weight loss (*external* regulation). Others pressure themselves into eating regulation because they feel ashamed or guilty about their weight or because they hope to garner a sense of self-worth through successful eating regulation (*introjected* regulation). In contrast, autonomous motives are characterized by a sense of volition, which may stem from an individual valuation of the behaviour in terms of importance for self-selected life goals (i.e., *identified* or *integrated* regulation) or from inherent enjoyment or interest in eating regulation (i.e., *intrinsic* motivation).

Several studies have investigated the relationship between autonomous and controlled eating regulation motives and eating behaviours. In a sample of college students, Pelletier, Dion, Slovenic-D'Angelo, and Reid (2004) found that autonomous motives for eating regulation were associated with healthier eating, whereas controlled motives for eating regulation were associated with more bulimic symptoms and less healthy eating behaviours (see also Otis & Pelletier, 2008; Pelletier & Dion, 2007). Pelletier et al. (2004) also found, in a group of patients at risk for coronary heart disease, that autonomous motives for eating regulation were associated with significant improvements in healthy eating behaviours at 26 weeks, which was also reflected in improved weight and blood parameters. Finally, Strong and Huon (1999) found that controlled motives for eating regulation were related to more extreme and rigid dieting behaviours across 5 months in a large sample of female adolescents. Together, these studies highlight the

importance of considering the types of motives underlying eating regulation for understanding when eating regulation is associated with healthy and dysfunctional outcomes.

Is the "What" any different of the "Why" of eating regulation? Although goal-content and motives represent two important dimensions of motivation (Deci & Ryan, 2000), previous studies have focused uniquely on either eating regulation goals (e.g., Verstuyf, Vansteenkiste, et al., 2012) or eating regulation motives (Pelletier & Dion, 2007). In the present study, both motivational processes were addressed simultaneously and their independent contribution in predicting healthy eating behaviours and disordered eating symptoms was examined. This is an important issue because the goal-content distinction has been portrayed by some scholars as "old wine in new bottles" (Carver & Baird, 1998; Srivastava, Locke, & Bartol, 2001). That is, the distinction between intrinsic-extrinsic goals would completely parallel the autonomous-controlled motivation distinction such that (a) both sets of concepts would correlate perfectly and (b) there would be no unique correlates being associated with goal-contents after taking into account motives.

With respect to the relation between both dimensions, past research in domains as diverse as individual strivings (Sheldon, Ryan, Deci, & Kasser, 2004), physical activity (Sebire, et al., 2009, 2011), and materialism (Gardarsdottir, Dittmar, & Aspinall, 2009) has shown that both sets of concepts are distinct. That is, although intrinsic goal pursuits are typically regulated by relatively autonomous motives and extrinsic goals are typically regulated by relatively controlled motives, there is no one-to-one (i.e., perfect) association between both. With respect to the independent contribution of goal-contents above regulations, the evidence so far has been mixed. For instance, Sheldon et al. (2004) reported in a series of four studies that intrinsic, relative to extrinsic, goal striving related uniquely to well-being beyond the autonomous and controlled motives underlying goal striving, while Sebire and colleagues (2009, 2011) found that goal-contents

only yielded an independent association with well-being, but not with physical activity levels. Clearly, more research is needed. Hence, we examined whether appearance-focused and health-focused eating regulation would yield adverse relations to healthy and disordered eating outcomes, even after taking into account autonomous and controlled motives underlying eating regulation. To our knowledge, this was the first study to examine goals and motives underlying eating regulation simultaneously in relation to healthy and disordered eating behaviours.

Understanding the Detrimental Effect of Eating regulation: Basic Psychological Need Frustration

Eating regulation is a hard and challenging task that consumes much energy from most dieters (Baumeister & Heatherton, 1996). However, the type of motives and goals underlying eating regulation might relate differentially to the degree to which it is energy-draining and frustrating. The concept of need frustration might be an important explanatory role in this regard. Central within SDT is the notion that people have three basic psychological needs, that is, the needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). These needs are conceived as the fundamental energetic resources for individuals' growth, adjustment, and health. When satisfied, the needs would promote well-being and integration, whereas frustration would create vulnerability to ill-being and psychopathology (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Vansteenkiste & Ryan, 2013; Verstuyf, Patrick, et al., 2012). First, autonomy reflects the need to feel a sense of volition, meaning and psychological freedom. When this need is frustrated, people feel pressured and compelled to do things against their will. Second, competence refers to the need to experience self-efficacy and to feel capable of achieving important goals. When frustrated, people feel inadequate and experience a sense of inferiority. Third, relatedness refers to the need to feel authentically connected to other people. When frustrated, people feel lonely and alienated

from their social environment. In line with the basic premises of SDT, numerous studies have shown that satisfaction of these needs relates to overall well-being (e.g., Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan, Huta, & Deci, 2008), whereas domain-specific need satisfaction relates to more domain-specific adjustment (for an overview see Vansteenkiste, et al., 2010). Recent studies indicated that need frustrating experiences in particular, rather than a mere lack of need satisfaction, were related to adverse outcomes and psychopathology (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011; Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013).

Some studies have investigated the role of psychological need frustration specifically in the context of eating behaviours. Some studies focused on general need frustration, that is, experienced need frustration across life domains. General need frustration was associated with body image concerns and unhealthy weight control techniques such as skipping meals and vomiting (Ng, Ntoumanis, Thogersen-Ntoumani, Stott, & Hindle, 2013; Thogersen-Ntoumani, Ntoumanis, Cumming, & Chatzisarantis, 2011; Thogerson-Ntoumani, Ntoumanis, & Nikitaras, 2009). Further, general need frustration predicted increases in binge eating symptoms over a 6-month time interval (Boone, Vansteenkiste, Soenens, Van Der Kaap-Deeder, & Verstuyf, in press) and changes in daily experiences of need frustration were associated positively with changes in daily experiences of binge eating symptoms (Verstuyf, et al., 2013). Other studies examined the association between domain-specific need frustration and eating behaviours. For instance, Bartholomew et al. (2011) showed that female athletes whose psychological needs were frustrated during practice reported more disordered eating behaviours. Verstuyf, Vansteenkiste, et al. (2012) found that female adolescents who reported diet-specific need frustration experience more binge eating symptoms.

Basic psychological need frustration might also explain the relation between appearance-focused and controlled eating regulation and maladaptive eating outcomes. Standards for beauty as portrayed in current society are excessively high and most girls and women are unlikely to meet these standards of beauty (Dittmar, 2007; Ogden, 2010). Therefore, appearance-focused dieters might more often have the feeling they fail in their eating regulation, thereby experience competence frustration (Klesse, Goukens, Geyskens, & de Ruyter, 2012). Further, once dieters are focused on their appearance, they might also increasingly pay attention to and more readily experience sociocultural pressures to be thin (Brown & Dittmar, 2005), thereby feeling pressured to regulate their eating behaviours. Finally, a focus on appearance can be a source of tension or alienation with important others (i.e., relatedness frustration). For instance, appearance-focused dieters might compare themselves more often and might even compete with peers to evaluate their own appearance (Ferreira, Pinto-Gouveia, & Duarte, 2013). In line with these hypothesis, appearance-focused eating regulation was found to relate to diet-specific need frustration which, in turn, was related to binge eating symptoms (Verstuyf, Vansteenkiste, et al., 2012).

Similarly, controlled motives for eating regulation might be related to disordered eating behaviours through need frustrating experiences. Individuals who regulate their eating behaviours because they feel pressured to do so by others or to avoid feeling ashamed or guilty about their weight, might criticize themselves more strongly when dieting restrictions are violated (competence frustration). Also, they may feel as if they have no other choice than to follow rigid dieting rules (autonomy frustration) and they may be overly sensitive to remarks of others about weight or appearance, such that they more easily experience social tension (relatedness frustration). To sum up, both appearance-focused eating regulation and controlled motives for eating regulation are likely to evoke need frustrating experiences. To our knowledge, no previous studies examined the intervening role of diet-specific need frustration in the relation between

motives for eating regulation and disordered eating outcomes. In the present study we aimed to extend previous lines of research by simultaneously examining motives and goals in the prediction of diet-specific need frustration and healthy and disordered eating outcomes.

Goals, Motives and Eating Outcomes: What's the Role of Age and Weight Status?

A final aim involved investigating whether age and weight status would play a role in these motivational dynamics. First, we examined whether there would be mean-level differences (a) between late adolescent and adult women and (b) between normal-weight and overweight women in terms of eating regulation motives and goals. Previous research indicated that younger girls are more vulnerable to sociocultural pressures to be thin (Groesz, et al., 2002) and more often focus on their appearance (Putterman & Linden, 2004). Also, SDT-based research has shown that people tend to orient less strongly towards extrinsic goals and controlled motives when growing older (Sheldon & Kasser, 2001). In line with these findings, younger dieters might focus more often on their appearance and might feel more pressured in their eating regulation compared to adult dieters. Further, normal-weight and overweight dieters might also differ from each other on the type of motives underlying their eating regulation. For instance, overweight individuals are evaluated more negatively in Western society and overweight is equated with undesirable characteristics such as laziness and lack of self-control (Ogden, 2010). Therefore, overweight individuals might feel a stronger pressure to regulate their eating behaviours. On the other hand, overweight dieters are at risk for several medical problems (Haslam & James, 2005) and, therefore, health goals might be more salient for overweight, compared to normal-weight, individuals.

In addition to investigating mean-level differences in age and weight groups, we also examined whether age and weight group would moderate the hypothesized relation between motivation, diet-specific need frustration

and eating behaviours. Such comparisons allowed us to address the question whether controlled motivation and appearance-focused eating regulation yields a different risk for disordered eating symptoms in adolescent, compared to adult, and overweight, compared to normal-weight, self-declared dieters. Or, in contrast, would the experience of pressure be good for some dieters, perhaps especially among those who are in need of change? Within SDT, basic psychological needs are considered universal across cultures and age groups (Chen, 2013; Sheldon, Cheng, & Hilpert, 2011). Hence, although mean-level differences are expected to occur, need frustration is hypothesized to yield similar correlates among adult compared to late adolescent self-declared dieters and among overweight compared to normal-weight self-declared dieters.

Present Study

The broader aim of the current study was to investigate whether the types of motives and goals underlying eating regulation are related differentially to diet-specific need frustration and healthy and disordered eating outcomes in group of late adolescent and adult female self-declared dieters with or without overweight. Specifically, we investigated four research questions (RQ). First, we examined whether there are mean-level differences in goals, motives, diet-specific need frustration and eating outcomes as a function of age and weight group (RQ1). Second, we examined whether goals and motives are related differentially to healthy eating behaviours and disordered eating symptoms (i.e., drive for thinness and binge eating symptoms; RQ2). Third, we examined whether diet-specific need frustration can explain (i.e., mediate), at least partially, the relation between goals and motives and eating outcomes (RQ3) and, finally, whether there are structural differences in these relations according to age and weight group (RQ4).

Participants in this study were individuals who indicated they were currently dieting, either on themselves or in a commercial weight loss

program. At the beginning of the study, motives and goals for eating regulation were assessed. Next, diet-specific need frustration and eating behaviours were assessed on seven consecutive days in a diary. Diaries offer the opportunity to investigate dieters' experiences and eating behaviours within an everyday context, which increases the ecological validity of the study (Bolger, Davis, & Rafaeli, 2003). Further, given the limited time interval between the assessment of dieters' experiences and behaviours, the likelihood of measurement errors due to retrospective recall are reduced, which increases the reliability and validity of the study (Bolger et al., 2003). We expected that appearance-focused and controlled eating regulation would be related to more diet-specific need frustration which, in turn, would be positively related to drive for thinness and binge eating symptoms. Further, we expected that health-focused and autonomous eating regulation would be related to more healthy eating behaviours. Finally, we expected that, in spite of mean-level differences, the relationships between goals and motives, diet-specific need frustration and eating behaviours would be comparable across younger and adult dieters and across normal-weight and overweight dieters.

Method

Sample and Procedure

Female self-declared dieters aged 16 to 20 (late adolescent sample) and 35 to 55 (adult sample) were invited by bachelor students in psychology to take part in a diary study on their daily eating habits. Students were asked to include only participants who reported they were currently on a diet to maintain or lose weight. In total 197, dieters participated, 99 of which were late adolescents (M_{age} = 18.84) and 98 of which were adult women (M_{age} = 45.06). Most participants (67.6%) had a healthy weight, whereas 23.6% were overweight and 8.8% underweight. Given the small number of underweight dieters (N = 16) and the observation that underweight dieters scored significantly lower (M = 4.50; $F(2, 178) = 6.82$, $p < .001$) on the intention to diet compared to normal weight (M = 5.52) and overweight dieters (M =

5.57), we excluded these participants from further analyses. Most participants were highly educated. In the group of adolescents, 75.5% were enrolled in higher education. The other adolescents were attending secondary school with 9.2% being enrolled in academic education, 7.2% in technical education, 2.1% in vocational education and 5.7% attending a specialist year after having finished a technical or vocational track. In the group of adult women, 59.1% had completed higher education, whereas 4.8%, 10.8% and 9.6% had finished, respectively, the academic, technical, or vocational track at secondary school. Only 4.8% of adult women had no or minimal secondary education.

Prior to participating in the diary study, informed consents were signed by participants and by one of the parents for under-aged participants. During this first visit, participants completed a set of self-report questionnaires including items tapping into demographic information (e.g., age, education, height and weight) and measures of motivation for eating regulation (e.g., goals and motives). At the end of the first visit, participants were handed over a booklet of questionnaires which had to be filled out in the evenings before bedtime for 7 consecutive days. Participants received an e-mail or text message each evening to help them remember to fill in the questionnaires. Finally, the students who contacted the participants visited the participant at home a second time at the end of the study to collect the diary questionnaires and answer any remaining questions.

Measures

Demographic variables. Participants reported their age, educational level and height and weight. Based on self-reported height and weight, BMI was calculated with the formula [weight in kg/(2*length in m)]. Participants with a BMI between 18.50 and 24.99 were categorized as normal-weight (68%), whereas participants with a BMI of at least 25 were categorized as overweight (24%; 7% missing).

Eating regulation goals. An adapted version of the Aspiration Index (Kasser & Ryan, 1996), which assesses people's life aspirations, was used to measure participants' goals for eating regulation. This adapted questionnaire has been used successfully in a previous study on eating regulation (Verstuyf, Vansteenkiste, et al., 2012). Two types of goals were assessed, that is, the intrinsic goal of physical fitness and health (3 items) and the extrinsic goal of physical appeal and beauty (3 items). After reading the stem "*I regulate my eating behaviours because...*", participants indicated on a 7-point Likert scale ranging from 1 (*not at all important*) to 7 (*very important*) how strongly they valued each of the eating regulation goals. An example of health-focused eating regulation is "*because I want to keep fit*", whereas an example of physical appearance-focused eating regulation is *"because I want to have more muscles or to be thinner to look more attractive"*. Cronbach's alpha was .83 and .79 for health-focused and appearance-focused eating regulation, respectively.

Eating regulation motives. Eating regulation motives were assessed with the self-regulation questionnaire (SRQ; Levesque et al., 2007; Ryan & Connell, 1989). The SRQ refers to a battery of questionnaires which assess domain-specific individual differences in autonomous and controlled motivation. The SRQ has been used in several domains (e.g., school, sports, treatment). Each questionnaire asks why the respondent engages in a specific behaviour and then provides specific reasons that represent the different types of motivation. Similar to Pelletier et al. (2004), participants were presented with the sentence "*I regulate my eating behaviours because ... "*, followed by sixteen items reflecting intrinsic (e.g., *"Because I enjoy regulating my eating behaviours"*), identified (e.g., *"Because regulating my eating behaviours fits in with what I find truly important in life"*), introjected (e.g., *"Because only then I can feel good about myself"*) and external motives (e.g., *"Because others would like me more"*). Items were rated on a 5-point Likert scale, ranging from 1 (*Completely disagree)* to 5 (*Completely agree*). As in previous studies (Otis & Pelletier, 2007), a composite score for

autonomous motivation was calculated by averaging the items for intrinsic and identified motivation (r = .60; alpha = .89). A score for controlled motivation was calculated by averaging the items for introjected and external motivation (r = .55; alpha = .84).

Diet-specific need frustration. Diet-specific need frustration was measured on seven consecutive days. The six items used to assess diet-specific need frustration were validated in previous studies (Verstuyf, Vansteenkiste, et al., 2012; Verstuyf, et al., 2013). Participants indicated on a scale from 1 (*completely disagree*) to 5 (*completely agree*) how much they agree with items such as *"Today I felt frustrated because I couldn't eat what I wanted to"* (autonomy frustration*), "Today I felt like I'll never be able to regulate my food intake"* (competence frustration)*, "Today I felt tension with people who are important to me because of my dieting behaviours"* (relatedness frustration). Mean scores were calculated for each day and then aggregated across the seven days for each participant. Cronbach's alpha of the aggregated scores was .86 .

Healthy eating behaviours. To measure healthy eating, 6 items from the Healthy Eating Habits Scale (HEHS; Pelletier & Dion, 2004) were selected. This scale was constructed in collaboration with nutritionist and intents to measure the amount of healthy and unhealthy foods people usually eat. Participants answered on 7 consecutive days on a scale from 1 *(not at all)* to 5 *(a lot)* to items such as *"Today I ate vegetables"* and *"Today I ate a variety of foods as recommended in the food pyramid"*. An average score on healthy eating behaviours was created by aggregating the scores across days within individuals. Cronbach's alpha was .69 .

Drive for thinness and binge eating symptoms. Drive for thinness and binge eating symptoms were assessed with the drive for thinness and bulimia subscales of the Eating Disorder Inventory (EDI; Garner, 1991). All items were filled out daily on a scale from 1 (*never*) to 6 (*always*). Drive for thinness refers to an excessive concern with eating, preoccupations with weight and fear of weight-gain. Items were adjusted such that they tapped

into concerns during the past day (e.g., Verstuyf et al., 2013). An example item is "*Today I was terribly scared to gain weight*". Cronbach's alpha of the average score was .90. The bulimia subscale assesses "the tendencies to think about and engage in bouts of uncontrollable overeating" (Garner, 1991, p. 5). One item was not included in the computation of the scale score (i.e. "*I have thought of trying to vomit in order to lose weight"*) because we were mainly interested in binge eating symptoms rather than compensatory bulimic behaviours. An example item is "*Today I had episodes of eating in which I felt like I cannot stop eating*". Cronbach's alpha was .90.

Analytical Plan

Prior to investigating the main research questions, bivariate correlations between study variables were calculated. To investigate mean-level differences (RQ1), means and standard deviations for the different outcomes as a function of age group and weight status were reported. A chi-square analysis investigated the distribution of participants in both age groups in function of weight status. Finally, a MANOVA was performed to investigate whether significant mean-level differences in study outcomes emerged according to age and weight group.

Manifest path analyses were used to investigate structural relationships between the study outcomes (i.e., RQ 2, 3 and 4). In each model we controlled for relevant background variables, that is educational level, BMI and age. Model fit was assessed using the chi-square statistic, the root-mean-square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), and the comparative fit index (CFI). Combined cut-off values of .08 or lower for the RMSEA, and .09 or lower for the SRMR indicate a good model fit (Bentler, 1990; Hu & Bentler, 1999). In addition, a CFI with values of .90 or higher reflects an acceptable fit (Bentler, 1990). In all models we used the principle of parsimony, meaning that the simplest model was preferred over more complex models. To directly compare models, Difference-In-Chi-Square Tests were performed. If

a simpler model did not result in a significant worse fit to the data, this model was preferred over the more complex model.

We began with examining the relationships between goals and motives and eating behaviours (RQ 2). Next, we investigated whether diet-specific need frustration could account for (i.e., mediate) the relationships between goals and motives and eating outcomes (RQ 3). The relationships between (a) goals and motives and diet-specific need frustration and between (b) diet-specific need frustration and eating outcomes were investigated separately. Based on significant paths in (a) and (b), we tested a full mediation model in which goals and motives predicted diet-specific need frustration which, in turn, predicted eating behaviours. This model was compared with a partial mediation model in which direct paths between goals and motives and eating outcomes were allowed. Finally, multi-group modeling was used to test whether structural relationships differed according to age group and weight status (RQ 4). Models in which structural relationships were set equal across groups (i.e., constrained model) were compared to models in which structural relationships were allowed to vary across groups (i.e., free model). Again, a chi-square difference test was used to evaluate whether the fit deteriorated if structural paths were constrained across groups.

Results

Preliminary Analyses

Bivariate correlations between the measured variables can be inspected in Table 1. The two eating regulation goals (appearance-focused and health-focused) were positively interrelated and so were the two regulatory styles (autonomous and controlled). Further, health-focused eating regulation was associated positively with autonomous motivation, whereas appearance-focused eating regulation was associated positively with controlled motivation. Yet, these associations were moderate, providing initial evidence that the "What" and "Why" of eating regulation represent

distinct motivational dynamics. Correlations between the motivational constructs and the outcomes were in line with hypotheses.

Primary Analyses

RQ 1: Mean-level differences as a function of age and weight status. Table 2 presents means and standard deviations for the motivational measures and the different outcomes as a function of age group and weight status. Age and weight status were significantly intertwined ($\chi^2(1) = 17.27$, $p < .001$), such that in the late adolescent group 89% were normal-weight, whereas in the adult group only 61% were normal-weight. As a result, most overweight dieters were adults (i.e., 81%) and only 19% of the overweight dieters were late adolescents.

Next, a MANOVA revealed a significant multivariate effect of age group ($F(8,153) = 5.27$, $p < .001$) and weight status ($F(8,153) = 5.20$, $p < .001$) on the study variables. No significant multivariate interaction effect between age and weight group was found ($F(8,153) = 3.19$, *ns*). As for age effects, as can be noticed in Table 2, adolescent dieters scored significantly higher on appearance-focused eating regulation, controlled motivation, and diet-specific need frustration, whereas they scored lower on health-focused eating regulation and autonomous motivation compared to adult dieters. As for weight status, normal-weight dieters scored higher on health-focused eating regulation and autonomous motivation, whereas they scored lower on controlled motivation compared to overweight dieters. Further, normal-weight dieters scored lower on diet-specific need frustration, binge eating symptoms and drive for thinness compared to overweight dieters.

RQ 2: Associations between eating regulation goals and motives and eating outcomes. In a first model, all structural paths between goals and motives and eating outcomes were allowed. Several unique contributions of both the "What" and "Why" of eating regulation emerged. As for goals, health-focused eating regulation was associated positively with healthy eating behaviours and negatively with binge eating symptoms, but not with

drive for thinness. Appearance-focused eating regulation was associated positively with drive for thinness and (marginally) positively with binge eating symptoms, but not with healthy eating behaviours. As for motives, autonomous motivation was associated positively with healthy eating behaviours but not with drive for thinness or binge eating symptoms. Controlled motivation was associated positively with drive for thinness, but not with binge eating symptoms or healthy eating behaviours. The final model, in which non-significant paths were excluded, is presented in Figure 1 and had an excellent fit ($\chi^2_{(6)}$ = 8.04, *ns*; RMSEA = 0.05, SRMR = 0.03, CFI = 0.99).

RQ 3: The explanatory role of diet-specific need frustration. In a first model structural relationships between goals and motives and diet-specific need frustration were investigated. Appearance-focused eating regulation (β = .28, p < .001) and controlled motivation (β = .18, p < .05) yielded a unique positive association with diet-specific need frustration, whereas autonomous motivation (β = -.19, p < .001) and health-focused eating regulation (β = -.15, p = .07) were (marginally) negatively associated with diet-specific need frustration. Second, structural relationships between diet-specific need frustration and eating outcomes were examined. Diet-specific need frustration was associated positively with drive for thinness (β = .59, p < .001) and binge eating symptoms (β = .64, p < .001), whereas no relationship emerged with healthy eating behaviours (β = -.04, *ns*).

Next, the mediating role of diet-specific need frustration in the association between goals and motives and eating behaviours was examined. In the initial model, paths between both goals and motives with diet-specific need frustration as well as paths from diet-specific need frustration to drive for thinness and binge eating symptoms were allowed. This model resulted in an unacceptable fit ($\chi^2_{(13)}$ = 41.69, p < .001; RMSEA = 0.12, SRMR = 0.05, CFI = 0.91).

Therefore, in a second model, direct relationships between eating regulation goals and motives and eating behaviours that were significant in

previous analyses (i.e., RQ 2), were added to the mediation model. This resulted in a significant improvement in model fit ($\Delta\chi^2_{(7)} = 32.55$, $p < .001$). Yet, given the inclusion of diet-specific need frustration in this model, several paths (i.e., appearance-focused eating regulation to binge eating symptoms; health-focused eating regulation to binge eating symptoms; health-focused eating regulation to diet-specific need frustration) were not significant anymore and were again removed from the model. Removing these non-significant paths did not result in a significant worsening of the fit ($\Delta\chi^2_{(3)} = 4.70$, *ns*). The fit of the trimmed model, which is presented in Figure 2, was excellent ($\chi^2_{(9)} = 13.84$, *ns*; RMSEA = 0.06, SRMR = 0.03, CFI = 0.99). As can be noticed, diet-specific need frustration played an intervening role in a number of paths, while motivational variables also yielded a direct relation with eating outcomes in other cases. Inspection of the indirect effects revealed that appearance-focused eating regulation was indirectly positive associated with drive for thinness ($\beta = .10$, $p < .001$) and binge eating symptoms ($\beta = .06$, $p < .001$) via diet-specific need frustration, just as controlled motivation was indirectly positive related with drive for thinness ($\beta = .07$, $p < .05$) and binge eating symptoms ($\beta = .04$, $p < .05$) through diet-specific need frustration. Finally, autonomous motivation was indirectly related to drive for thinness ($\beta = -.07$, $p < .05$) and binge eating symptoms ($\beta = -.04$, $p < .05$) through a negative relation with diet-specific need frustration. In addition to these indirect effects through diet-specific need frustration, direct relations between health-focused eating regulation and autonomous motivation and healthy eating behaviours remained significant, just as the relations between appearance-focused eating regulation and controlled motivation and drive for thinness.

RQ 4: Do relationships differ according to age group and weight status? To examine whether structural relationships in the final model were similar across adolescent and adult dieters, a multi-group comparison was performed with age category as the moderating variable. A model in which all relationships were allowed to vary across adolescent and adult dieters was

compared with a model in which structural relationships were constrained. The constrained model did not result in a significantly worse fit to the data ($\Delta\chi^2_{(9)} = 9.91$, *ns*). Therefore, the structural relationships presented in Figure 2 can be considered equal across age groups.

Second, a multi-group comparison with weight group as moderating variable was performed. A model in which all relationships were allowed to vary across normal-weight and overweight dieters was compared with a model in which structural relationships were constrained. The constrained model did not result in a significantly worse fit to the data ($\Delta\chi^2_{(9)} = 15.95$, *ns*). Therefore, the structural relationships presented in Figure 2 can be considered equal across weight groups.

Discussion

In Western cultures, eating regulation is quite common among both normal-weight and overweight women (Serdula, et al., 1999). Unfortunately, eating regulation is not without risks and previous research has indicated that eating regulation can be related to more disordered eating symptoms as well as to more successful outcomes, such as healthy eating behaviours and decreased binge eating symptoms (Mann, et al., 2007; Stice, et al., 2008; Stice, et al., 2005). To provide support to dieters and to formulate advice about healthy ways of eating regulation, it is important to investigate when eating regulation is successful and when it relates to adverse outcomes (Groesz & Stice, 2007). In the current study, we investigated whether the "What" and the "Why" of motivation to regulate eating behaviours were differentially related to healthy eating behaviours and disordered eating symptoms in late adolescent and adult female dieters.

Both Goals and Motives Matter

Dieters can vary strongly in the type of motivation underlying their eating regulation efforts. Indeed, some dieters mainly focus on altering their appearance in the service of being more attractive, while others want to

become healthy and fit. Further, dieters might feel relatively more controlled versus autonomous in their eating regulation. In the current study, we found that both the goals and the motives underlying eating regulation had unique associations with healthy eating behaviours as well as with drive for thinness and binge eating symptoms. In general, health-focused and autonomous eating regulation was associated with positive outcomes and appearance-focused and controlled eating regulation was associated with adverse outcomes. These findings underline the importance of taking into account the quality of motivation. That is, not eating regulation in itself, but rather the motivational quality underlying eating regulation is related to healthy eating behaviours and disordered eating symptoms. These findings are in line with previous studies demonstrating the importance of goals (Putterman & Linden, 2004; Verstuyf, Vansteenkiste, et al., 2012) or the importance of motives (Pelletier & Dion, 2007; Pelletier, et al., 2004) in predicting eating outcomes.

A key and innovative finding of this study was that goals and motives for eating regulation emerged as two separable facets of motivation, each contributing uniquely to eating-related outcomes. First, autonomous motivation and health-focused eating regulation as well as controlled motivation and appearance-focused eating regulation were only moderately positively correlated. This finding already suggests that the content of dieters' goals cannot be reduced fully to the volitional (versus pressured) nature of their motives for eating regulation. Second, goals and motives yielded unique associations with eating outcomes. That is, appearance-focused eating regulation was positively related to binge eating symptoms and drive for thinness, even when controlled motivation was in the same model. This finding suggests that the detrimental effect of appearance-focused eating regulation cannot be accounted for fully by the fact that people who endorse an appearance focus typically engage in eating regulation for relatively controlled reasons. Similarly, health-focused eating regulation was associated with healthy eating behaviours and binge eating

symptoms even when autonomous motivation was in the same model. These findings suggest that a focus on health has inherent adaptive value beyond the fact that people with a focus on healthy typically engage in eating regulation for autonomous reasons. These results are in line with Sheldon et al. (2004), who also found unique associations of goals on several outcomes after controlling for the motives. In other words, the results of the current study contradict the statement that the goals are "old wine in new bottles" (Carver & Baird, 1998) and underline the importance of considering both the goals and the motives underlying behavioural regulation. Still, given that this study is among the first to examine the independent contribution of goals and motives in eating outcomes and given that others (e.g., Sebire et al., 2009, 2011) have found opposite evidence in other domains (e.g., the domain of physical activity), more research is needed to fully understand the unique role of goals and motives on outcomes.

Diet-specific Need Frustration as an Explanatory Variable

An important question is which processes can account for the relations between motivation and eating outcomes. In this study we investigated whether diet-specific need frustration can explain why some types of motivation yield into disordered eating symptoms. We found that appearance-focused and controlled eating regulation were associated with drive for thinness and binge eating symptoms through diet-specific need frustration. This finding suggests that individuals who engage in eating regulation in the service of attractiveness and for controlled reasons are more likely to experience their eating regulation as a pressuring burden (autonomy frustration), as an activity towards goals that are almost impossible to achieve (competence frustration), and as an activity that tends to alienate one from others (relatedness frustration). Such experiences of need frustration, in turn, were found to predict disordered eating symptoms. The latter finding is consistent with the theoretical argument that diet-specific need frustration results in a lack of energy to regulate eating in constructive ways (Verstuyf,

Patrick, et al., 2012). For instance, because their energy is depleted, individuals experiencing diet-specific need frustration would be more prone to lowered self-control and would be less able to resist the temptation to eat high caloric foods. Particularly in stressful circumstances, they might overcompensate for need frustration by eating large and/or high caloric portions of food (Boone, et al., in press; Schueler & Kuster, 2011; Verstuyf, Patrick, et al., 2012; Verstuyf, et al., 2013).

Future studies could investigate more specifically why these types of motivation give rise to need frustrating experiences. If goals and motives indeed have distinct and unique associations with need frustration and eating outcomes, one might assume that the intervening processes leading to these outcomes are also to some extent unique. An examination of these unique pathways requires a micro-approach to the mediating processes accounting for the dynamics of eating regulation goals and motives. For instance, dieters who feel pressured (i.e., controlled motives) might use more rigid and drastic dieting strategies (Otis & Pelletier, 2008; Strong & Huon, 1999). Also, when confronted with setbacks, people high on controlled motivation may more easily engage in self-criticism and negative self-talk (Soenens et al., 2008). As for goal content, extrinsic goals have a more outward orientation compared to intrinsic goals (Vansteenkiste, et al., 2008). Appearance-focused dieters might direct their attention more towards expectations of others and compare themselves more often to idealized images of beauty, whereas health-focused dieters focus on the process of eating in itself. In line with this, in an experimental study, exposure to the thin-ideal during one's diet was related to more unhealthy eating behaviours, an association that was accounted for by increased feelings of unattainability (e.g., Klesse, et al., 2012). Future research could look into these more specific and micro-mediational mechanisms.

Finally, autonomous motivation was related indirectly to decreased drive for thinness and binge eating symptoms through a negative relation with diet-specific need frustration. Again, the style of eating regulation that

is provoked by one's motives may perhaps explain this relation. Otis and Pelletier (2008) found that autonomous dieters approach healthy foods rather than avoiding unhealthy foods. Such flexible and approach-oriented dieting might explain why dieters with autonomous motives experience less need frustrating experiences such as perceived failure, pressure, and social isolation. As such, these findings show that autonomous motivation can be a protective factor against the feelings of frustration and energy depletion oftentimes associated with eating regulation. This finding is important because, although many studies have documented the potential undermining effects of eating regulation and the factors that account for these undermining effects, relatively fewer studies have addressed factors that can protect individuals against the potentially ironic and harmful effects of eating regulation.

Age and Weight Status: A Different Motivational Profile?

Do adolescent and adult dieters and normal-weight and overweight dieters differ in terms of their motivational profile? We found that adolescent dieters, compared to adult dieters, and overweight dieters, compared to normal-weight dieters, had a more dysfunctional motivational profile. First, younger dieters' eating regulation was driven more often by pressures rather than by individually endorsed goals and feelings of enjoyment and challenge. Younger dieters also focused more strongly on appearance goals and less on health compared to adult dieters. These results are consistent with previous studies indicating that younger women are more vulnerable to sociocultural pressures to be thin and body image concerns (Groesz, et al., 2002) and that younger people are oriented more generally towards controlled motives and extrinsic goals than older people (Sheldon & Kasser, 2001). Second, overweight dieters reported more pressures for eating regulation and less autonomous motives. The finding that overweight individuals report more pressures is not surprising. Indeed, negative stigmata about overweight are highly prevalent in Western societies and, oftentimes,

overweight individuals are individually blamed for being overweight (Ogden, 2010). Perhaps more surprisingly, overweight individuals also valued eating regulation less in terms of their health. One could argue that health-focused eating regulation would be heightened in overweight individuals because they are more at risk for developing health problems (Haslam & James, 2005). Perhaps, the pressures associated with eating regulation in overweight individuals evoke a sense of reactance, such that overweight dieters in time give up or rebel against the "dieting culture" and its obsession with health. Indeed, research in other life domains has shown that when individuals feel pressured and coerced, they are likely to rebel against the source of the pressure (e.g., Vansteenkiste, Soenens, Van Petegem, & Duriez, in press). Research specifically in the domain of health management has shown that people are more likely to adopt advice concerning health if the advice is communicated in an autonomy-supportive rather than in a controlling fashion (Pavey & Sparks, 2010).

In spite of the mean-level differences between normal-weight and overweight dieters, associations between the motives and goals for eating regulation and the outcomes were strikingly similar for both groups. Intuitively, one might argue that experiences of pressures for eating regulation might be less detrimental or even benign when people are overweight. Indeed, overweight and obesity are major societal problems and feeling pressured to adopt a healthier lifestyle could prevent people from becoming overweight. However, in the current study, we found that controlled motivation and appearance-focused eating regulation were not related to healthy eating behaviours (but rather to drive for thinness and binge eating symptoms), even among overweight people.

Further, controlled motivation and a focus on appearance were equally detrimental in groups of young and adult dieters. In other words, perceived pressures and appearance-focused eating regulation seemed to be bad for everyone. Given that younger and overweight dieters already have a more dysfunctional motivational profile and given that the poor quality of

motivation is related to more disordered eating symptoms, it is important that health care providers are aware of the motivational dynamics in these groups such that they do not put additional pressures on individuals to regulate their eating behaviours.

Limitations and Suggestions for Future Research

The current study had a number of methodological and conceptual limitations. Although the sample was quite diverse in terms of age, the number of overweight women was limited. It would have been interesting to investigate differences between overweight adolescent dieters and overweight adult dieters in greater detail. Due to the small sample size of adolescent overweight dieters, there was not enough statistical power to perform these more detailed comparisons. Further, future studies could also include underweight participants to investigate whether the findings obtained would also generalize to underweight dieters. Possibly, outcomes other than binge eating symptoms, such as drive for thinness, rigid dieting, and restrictive eating patterns are more salient in the latter population. Another limitation was the short term follow-up of the dieters. We aimed to investigate dieting experiences and eating behaviours ecologically valid by using a diary approach. However, dieters were followed only for one week. It would be interesting to investigate the role of goals and motives for eating regulation on long-term changes in eating outcomes and weight. Ideally, such longitudinal studies would include assessments of all constructs at all time points, thus allowing for an examination of direction of effects in associations between the variables and, in particular, for an examination of the possibility that there is a reciprocal associations between quality of motivation and eating outcomes. For instance, an episode of binge eating may not only be the consequence of need frustration but may also elicit feelings of need frustration (failure in particular), such that people pressure themselves more to engage in a rigid diet, thus strengthening their controlled motivation.

In addition to these methodological considerations, also some conceptual limitations can be noted. First, we only measured the concept of diet-specific need frustration (not need satisfaction). Although diet-specific need frustration seems like an ideal candidate to explain why eating regulation is sometimes experienced as energy-draining and why disordered eating behaviours occur, diet-specific need satisfaction could also play an important role. That is, some dieters might actually derive a sense of need satisfaction from their eating regulation, especially when they are focused on health and autonomous motives. For instance, dieters might feel increasingly capable at regulating their eating behaviours successfully or they might derive a sense of relatedness from regulating their eating behaviours together with other dieters. Some might even feel more free in their eating behaviours, such that they feel as if they have many options to eat healthy foods. Such experiences of need satisfaction involve more than just an absence of need frustration and might be relatively more predictive of positive and healthy outcomes than a lack of need frustration (Vansteenkiste & Ryan, 2013). As such, diet-specific need satisfaction might mediate (at least partially) the relationships between health-focused and autonomous eating regulation and healthy eating behaviours, relationships that were not mediated by need frustration. Further, it would also be interesting to investigate the three psychological needs separately. Due to the relative small number of items in this study and insufficient reliability of the separate needs scales, we could not further invest the unique roles of the three needs in the current study. Future studies might include more items, such that a separate analysis of the three needs is possible.

Clinical Implications

Although the study had some methodological and conceptual limitations, the results also suggest some important societal and clinical implications. In current society, the increase of overweight and obesity is taking epidemic proportions which is alarming, especially given the high

cost of obesity in terms of health and quality of life (Haslam & James, 2005). Not surprisingly, health care providers warn people for the health costs of their obesity. To persuade people to regulate their eating behaviours, some health care providers might even point to the influence of overweight on attractiveness, especially with adolescent overweight individuals. Although well-meant, the current study indicates that pressuring people into changing their lifestyle might backfire, such that pressured dieters and dieters focused on attractiveness experience more binge eating symptoms and, thus, over time would gain rather than lose weight (Masheb, White, & Grilo, 2013). Rather than pressuring overweight individuals to regulate eating behaviours, one could explore, from the perspective of the patient, which effects eating regulation could have in terms of individually endorsed life goals. Health care providers could also try to increase the level of enjoyment and challenge experienced during eating regulation.

Further, the current study also yielded more insight into the mechanisms of eating regulation failure. Based on the results of this study, it seems important to encourage and guide dieters to set attainable goals, such that they develop a sense of competence. Also, flexible rather than rigid eating regulation could be promoted, such that dieters feel less pressured in their choices for food intake. Finally, dieters could be encouraged to seek for support in their eating regulation, for instance from other dieters or from their partner or family. Such could decrease the level of diet-specific need frustration, thereby limiting the energy-draining character of eating regulation and, thus, potentially promoting long-term changes in eating behaviours. In line with these hypothesis, a recent study found that autonomy supportive practices (by partners) in individuals with weight-loss goals were related to increases in need satisfaction and life quality, whereas controlling practices were related to increases in need frustration and depressive symptoms and unhealthy dieting strategies (Ng, et al., 2013)

Table 1

Bivariate correlations between study outcomes

	1	2	3	4	5	6	7
1. Health-focused eat. reg.	1						
2. Appearance-focused eat. reg.	.28***	1					
3. Autonomous motivation	.31***	.11	1				
4. Controlled motivation	.03	.43***	.18*	1			
5. Diet-specific need frustration	-.12	.21**	-.28***	.30***	1		
6. Healthy eating behaviours	.22**	-.02	.24**	-.10	-.08	1	
7. Binge eating symptoms	-.12	.12	-.14	.20*	.59***	.03	1
8. Drive for thinness	.07	.34***	-.05	.38***	.59***	.15	.47***

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

Table 2

Means and standard deviations for the different outcomes as a function of age group and weight status together with ANOVA results for age group and weight status effects

		Total	Normal Weight	Overweight	Age Group Effects		
		N = 76	*N* = 68	*N* = 8	*F*(1, 160)	*p*	Effect-size
	Health-focused eat. reg.	5.68	5.75	5.00	9.56	.00	.06
	Appearance-focused eat. reg.	5.48	5.50	5.29	4.48	.04	.03
Late-adolescents	Autonomous motivation	3.55	3.67	2.56	9.91	.00	.06
	Controlled motivation	3.32	3.23	4.06	4.82	.02	.03
	Diet-specific need frustration	1.74	1.68	2.28	11.06	.00	.07
	Healthy eating behaviours	2.69	2.70	2.58	0.62	*ns*	.00
	Binge eating symptoms	1.31	1.29	1.44	0.58	*ns*	.00
	Drive for thinness	2.49	2.46	2.72	0.10	*ns*	.00
		Total	Normal Weight	Overweight	Weight Status Effects		
		N = 88	*N* = 53	*N* = 35	*F*(1, 160)	*p*	Effect-size
	Health-focused eat. reg.	6.03	6.04	6.01	3.64	.06	.02
	Appearance-focused eat. reg.	4.92	5.13	4.62	2.10	*ns*	.01
Adults	Autonomous motivation	4.03	4.24	3.70	9.05	.00	.05
	Controlled motivation	3.14	3.15	3.14	3.27	.07	.02
	Diet-specific need frustration	1.56	1.39	1.82	21.09	.00	.12
	Healthy eating	2.72	2.71	2.72	0.35	*ns*	.00
	Binge eating symptoms	1.27	1.17	1.44	5.74	.02	.04
	Drive for thinness	2.42	2.00	3.06	13.56	.00	.08

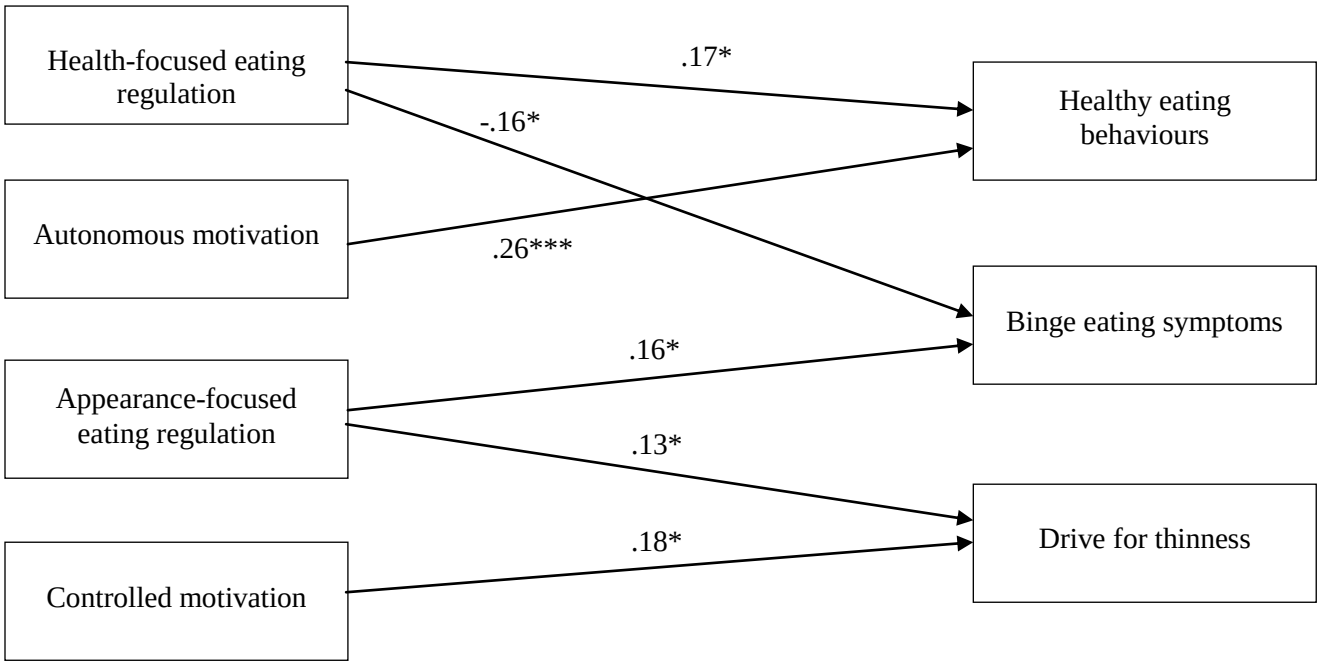

Figure 1. Structural relationships between eating regulation goals and motives and eating behaviours.

Chapter 6

Daily Ups and Downs in Women's Binge Eating Symptoms: The Role of Basic Psychological Needs, General Self-Control, and Emotional Eating[1]

The high prevalence rates of problematic eating behaviours, such as binge eating symptoms, have urged researchers to investigate why and when control over eating behaviours is lost. The current study employs a daily diary methodology to examine whether the daily satisfaction and frustration of the basic psychological needs for autonomy, competence, and relatedness, as conceptualized within Self-Determination Theory (Deci & Ryan, 2000), is associated with daily binge eating symptoms. In a sample of female adolescents (N = 302, age = 14-23), daily fluctuations in need frustration were related to daily fluctuations in binge eating symptoms. Furthermore, frustration of all three needs yielded an independent association with binge eating symptoms. Apart from the main effects of low self-control strength and emotional eating, emotional eating served as a moderator of the link between need frustration and binge eating symptoms. Theoretical and clinical implications of these findings are discussed.

[1] Verstuyf, J., Vansteenkiste, M., Soenens, B., Boone, L., & Mouratidis, A. (2012). Daily ups and downs in women's binge eating symptoms: The role of basic psychological needs, general self-control, and emotional eating. *Journal of Social & Clinical Psychology*, *32*, 335-361.

Introduction

Past research has indicated that adolescents and young adults suffer from many eating problems (Ogden, 2010). Prevalence rates of binge eating, which is defined as "episodes of eating which are experienced as excessive and beyond the subject's control" (Fairburn, 1984, p. 235), are high, with recent estimates of 19.6% in female adolescents (Goossens & Braet, 2010) and 12.9% in university students (Nicoli & Liberatori, 2011). These binge eating symptoms can contribute to overweight and obesity, which, in turn, are associated with a variety of physical (e.g., coronary disease, diabetes, hypertension; e.g., World Health Organization, 1996) and mental health (e.g., depressive symptoms, low self-esteem; e.g., Bray, 1986; Wadden et al., 2006) problems.

Given these high prevalence rates, it is important to investigate why people sometimes lose control over eating. Quite a lot of studies have addressed the role of individual characteristics (i.e., between-person differences), such as general self-control strength (e.g., Baumeister & Heatherton, 1996; Vohs & Heatherton, 2000) and eating style (e.g., Ouwens, van Strien, van Leeuwe, & van der Staak, 2009) in unsuccessful eating regulation. Another approach, however, is to investigate fluctuations in eating regulation from day to day. Indeed, besides the more general and relatively stable differences between persons in controlling eating behaviours, there is likely day-to-day variability within persons in binge eating symptoms. Simply put, one day is not the other.

Recently, there is a strong increase in interest in fluctuations in individuals' eating patterns (e.g., Haedt-Matt & Keel, 2011; O'Connor, Conner, Jones, McMillan, & Ferguson, 2009). However, to our knowledge, no previous study has relied on a general motivational framework to understand exactly why it is more difficult on some days to maintain control over eating. As controlling one's eating behaviours is an activity that involves self-regulation, motivation theories are particularly well suited to study this outcome. Grounded in Self-Determination Theory (SDT; Deci &

Ryan, 2000; Ryan & Deci, 2000), a broad motivation theory on optimal human development and growth, the main goal of the current diary study was to investigate whether daily satisfaction and frustration of the basic psychological needs for autonomy, competence, and relatedness, can explain within-person variability in binge eating symptoms in a large sample of nonclinical women. A secondary aim of the study was to investigate whether individuals who have relatively low self-control strength and those who have an emotional eating style are more prone to lose control over eating on days their psychological needs get frustrated.

The Ups and Downs in Binge Eating Symptoms

Previous research on within-person fluctuations in eating behaviours has focused mainly on the role of daily hassles and negative affect in snacking behaviours and binge eating. Daily hassles are defined as "events, thoughts, or situations which, when they occur, produce negative feelings such as annoyance, irritation, worry or frustration, and/or make you aware that your goals and plans will be more difficult to achieve" (O'Connor et al., 2009, p. 185). A number of studies found that daily hassles are associated with a variety of unhealthy eating behaviours, such as eating more high-fat foods and sugar snacks (O'Connor, Jones, Conner, McMillian, & Ferguson, 2008), snacking between meals (Conner, Fitter, & Fletcher, 1999), and eating less vegetables (e.g., O'Connor et al., 2008) on a daily basis. Further, in samples of eating disordered patients, negative affect has been found to precede binge eating symptoms (Haedt-Matt & Keel, 2011). For instance, in a comprehensive review, Haedt-Matt and Keel (2011) concluded that individuals experience more negative affect prior to binge eating episodes compared to their average levels of negative affect throughout the day. Also, specific emotional states such as anger (e.g., Engel et al., 2007; Smyth et al., 2007), low alertness (Greeno, Wing, & Shiffman, 2003) and stress (e.g., Smyth et al., 2007) have been found to precede binge eating symptoms. Apart from studies examining the role of emotions, other studies have shown

that decreases in self-concept (Steiger et al., 2005), poor social experiences (Steiger et al., 1999) and negative family interactions (Okon, Greene, & Smith, 2003) are related to daily binge eating symptoms.

The current study aims to extend previous work on processes involved in within-person fluctuations of binge eating symptoms by implementing a motivational perspective (Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012). Specifically, we aimed to investigate whether daily fluctuations in satisfaction and frustration of the basic psychological needs for autonomy, competence and relatedness, as defined within Self-Determination Theory (Deci & Ryan, 2000; Ryan & Deci, 2000), are associated with daily fluctuations in binge eating symptoms.

Self-Determination Theory: The Role of Basic Psychological Needs in Eating Regulation

SDT is a motivation theory that investigates individuals' adaptive (e.g., well-being) and maladaptive (e.g., psychopathology) functioning in general, but also in more specific behavioural contexts (e.g., work, sports, eating regulation). Central to SDT is the tenet that people are born with a set of basic psychological needs, which are considered as the psychological nutriments necessary for growth and integration (Ryan & Deci, 2000). Three universally important psychological needs have been identified, that is, the needs for competence, relatedness, and autonomy. Competence reflects the need to feel efficacious and capable of achieving desired outcomes. Relatedness involves the need to feel close to and valued by important others and to have a sense of belonging with peers, family, and the larger community. Finally, autonomy concerns the experience of volition and psychological freedom in carrying out an activity.

Consistent with SDT's claim that the psychological needs are implicated in individuals' adjustment, a variety of studies have demonstrated that need satisfaction is associated with more global well-being and with positive outcomes in specific behavioural contexts, such as sports, health care and

work (e.g., Vansteenkiste, Niemiec, & Soenens, 2010, for an overview). Conversely, need frustration has been found to be associated with more negative outcomes, such as emotional and physical exhaustion (e.g., Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). In addition, a few studies have addressed the question of within-person fluctuations in psychological need satisfaction and well-being. It has been demonstrated that individuals report more positive affect, more vitality, and less negative affect on days their needs had been satisfied, with all three needs yielding an independent contribution to these outcomes (Reis, Sheldon, Gable, Roscoe, & Ryan 2000; Ryan, Bernstein, & Brown, 2010; Sheldon, Ryan, & Reis, 1996).

No previous study has investigated within-person associations between daily need satisfaction and frustration and daily eating behaviours. However, a few previous studies that relied on between-person designs demonstrated that psychological need satisfaction is implicated in one's eating behaviours. Between-person differences in need satisfaction were found to be associated with a healthier diet, such as a higher intake of fruits and vegetables (see Ryan, Patrick, Deci, & Williams, 2008 for an overview), while the frustration of the psychological needs related to more unhealthy weight control behaviours (Thogerson-Ntoumani, Ntoumanis, & Nikitaras, 2010), more eating disorder symptoms (Bartholomew et al., 2011), and more binge eating behaviours (Schüler & Kuster, 2011; Verstuyf, Vansteenkiste, & Soenens, 2012).

The present study extends this rather small body of work by examining whether day-to-day fluctuations in need satisfaction and need frustration relate to daily variation in binge eating symptoms. Two different, albeit related, theoretical processes might help to understand why satisfaction and frustration of the psychological needs might relate to one's eating behaviours. First, individuals whose psychological needs are satisfied feel more energetic and vital (e.g., Ryan & Deci, 2008). As eating regulation is on average a challenging task that requires self-control and energy to resist

unhealthy foods (Vohs & Heatherton, 2000), the energy-providing character of need satisfaction (Moller et al., 2006) might prevent one of losing control over eating. Need frustrating experiences, on the other hand, might deplete energy (Muraven, Gagné, & Rosman, 2008) such that one does not have sufficient energy left to resist binge eating. Second, psychological need satisfaction and frustration might influence eating behaviours through the experience of positive and negative affect. Given that daily need satisfaction was found to relate to more positive affect and less negative affect (e.g., Ryan et al., 2010) and given that low positive affect and high negative affect were found to precede snacking (e.g., O'Connor et al., 2009) and binge eating behaviours (e.g., Haedt-Matt & Keel, 2011), these affective experiences may account for the association between psychological needs and binge eating symptoms.

The Moderating Role of General Self-control Strength and Emotional Eating

In addition to examining how daily need satisfaction and frustration relate to daily eating behaviours, we also examined whether individual (i.e., between-person) characteristics moderate these associations. In other words, is every person who experiences need frustration on a given day equally susceptible to losing control over eating behaviours that day? Are there individual characteristics that attenuate or strengthen the association between the psychological needs and binge eating symptoms? Based upon the hypothesized pathways of energy-depletion and negative affect, we reasoned that general self-control strength (Baumeister & Heatherton, 1996) and emotional eating style (e.g., O'Connor & O'Connor, 2004) may moderate the link between the psychological needs and binge eating.

The concept of self-control strength stems from the Self-Control Model (Baumeister & Heatherton, 1996), which states that people's self-control capacity is a limited resource or strength that gets depleted over time (i.e., ego-depletion). Self-control is defined as "the use of cognitive and

attentional resources to override, inhibit, or alter impulses in the service of attaining personal goals or satisfying motives" (Vohs & Heatherton, 2000, p. 214). On days people have engaged in various activities that require self-control, they are said to be less able to resist tempting foods because their limited energetic resources are eroded. Yet, there are considerable differences between persons in their general self-control strength, with high self-control strength being related to a variety of adaptive behaviours, both outside the eating domain (e.g., school performance, optimal emotional response; Tangney, Baumeister, & Boone, 2004) and within the eating domain (e.g., less bulimic and binge eating symptoms; Peluso, Ricciardelli, & Williams, 1999; Tangney et al., 2004).

In addition to examining the between-person effect of self-control strength in the prediction of binge eating across days, we investigated whether individuals with low self-control strength would be more prone to binge eating symptoms on need frustrating days. There is some indirect evidence for this moderation hypothesis. For instance, Schüler and Kuster (2011) found that the association between unfulfilled needs and binge eating was present for people low in achievement motivation, but not for those high in achievement motivation. As people high in achievement motivation have high self-control capacities (Mischel, 1961), Schüler and Kuster argued that differences in self-control could account for this moderation effect. Further, O'Connor and colleagues (2009) found that several aspects of conscientiousness, a personality dimension sharing conceptual overlap with the notion of self-control strength, moderates the relation between daily hassles and eating behaviours (O'Connor et al., 2009). In line with these findings, we hypothesized that daily associations between psychological need frustration and binge eating would be stronger for persons with low general self-control strength.

Next to self-control strength, we explored whether emotional eating would alter the relation between the psychological needs and binge eating. Emotional eating refers to a tendency to eat more when people feel anxious

or are emotionally aroused (e.g., O'Connor & O'Connor, 2004). It has been studied frequently as an individual characteristic that strengthens the relation between negative affect and binge eating symptoms. For instance, laboratory studies found that people with an emotional eating style ate more high-fat and/or sugared food after induction of negative affect or stress (e.g., Wallis & Hetherington, 2009; Loxton, Dawe, & Cahill, 2011), although other studies could not confirm these findings (e.g., O'Connor & O'Connor, 2004). The results of diary studies were equally mixed. Whereas O'Connor et al. (2008) reported that emotional eating moderated the association between daily hassles and snacking behaviours, Conner et al. (1999) reported no evidence for such a moderation effect. Given the mixed findings, we deemed it important to further explore this issue.

Present Study

In the present study we investigated the role of the psychological needs in the prediction of eating regulation by using diary methodology in a group of young female participants. Given that we wanted to investigate within-person processes, a diary study was considered an appropriate technique (Bolger, Davis & Rafaeli, 2003). Diaries offer the opportunity to investigate individuals' experiences within an everyday context, which increases the ecological validity of the study. Furthermore, given the limited time interval between the experiences and the measurement of these experiences, the likelihood of measurement errors due to retrospective recall are diminished, which increases the reliability and validity of the findings (Bolger et al., 2003).

The first and primary aim of the study was to examine within-person associations between the three basic psychological needs and binge eating symptoms within days. A prerequisite for investigating within-person processes is that there is significant within-person variability in binge eating symptoms. This means that, apart from differences between persons, there are considerable day-to-day fluctuations within persons. Therefore, we

began with examining the amount of variation situated at the within- and between-person level.

Next, we investigated whether an aggregated score of daily need satisfaction and an aggregated score of daily need frustration would be associated with daily binge eating symptoms. As recent studies indicate that need satisfaction is associated with more positive outcomes, whereas need frustration is associated with more negative outcomes (e.g., Bartholomew et al., 2011; Sheldon et al., 2011), we hypothesized that especially need frustration would relate to binge eating symptoms (Hypothesis 1).

Further, we investigated the unique contribution of each of the three needs. Whereas the use of a composite measure of need satisfaction and frustration (e.g., Schüler & Kuster, 2011) is valid in light of the high correlations between the three needs, it might also obscure unique effects of the three needs separately. Given that previous diary studies indicated that all three needs contributed uniquely to wellbeing (e.g., Ryan et al., 2010), we expected that the three needs would be associated uniquely with binge eating symptoms (Hypothesis 2).

A second aim involved investigating whether the individual characteristics of general self-control strength and an emotional eating style would moderate the within-person associations between the needs and binge eating. A premise for investigating these moderation effects, is that there are significant between-person differences in the strength of the associations between the needs and binge eating. If so, this opens the possibility to investigate which individual characteristics can explain this variability.

Specifically, two separate equations were built to investigate main and moderation effects of low self-control strength and emotional eating. In addition to a main effect of low self-control strength, we expected that especially people with low self-control strength, compared to those with high self-control strength, would be less able to control their eating on need frustrating or less need satisfying days (Hypothesis 3). Given the inconclusive evidence obtained in previous studies regarding the role of an

emotional eating style, we examined in a rather explorative fashion the possible main and moderating effects of emotional eating (Research Question 1). In examining this research question, we explored whether three between-person background variables, that is, BMI, educational level and age, had significant effects on binge eating symptoms and, thus, should be controlled for in the analyses.

Finally, in a set of ancillary analyses we investigated whether significant within-day associations between need satisfaction and binge eating symptoms also 'carried on' to the next day. Specifically, we wanted to explore whether need frustration and binge eating symptoms would also relate to each other across days (Research Question 2) and even mutually reinforce each other across days (Research Question 3).

Method

Sample and Procedure

Female adolescents aged 14 to 23 were invited by bachelor students psychology to take part in a diary study on their daily feelings and eating habits. Students were asked to exclude participants who currently have or have had an eating disorder in the past. In total 302 females with Belgian nationality aged 14 to 23 (mean age = 17.7) participated in the study. Most participants were attending secondary education in Flanders with 45.7% enrolled in academic education, 14.2% in technical education, and 3.7% in vocational education. In addition, 29.9% of the participants were enrolled in higher education and 4.1% were working. BMI ranged between 14.53 and 34.01 (M = 20.93; SD = 2.68). Prior to the diary study, informed consents were signed by participants and by one of the parents for under aged participants. During this first visit, participants completed a set of self-report questionnaires including items tapping into demographic information (e.g., age, education, height and weight) and measures of dispositional traits (e.g., general self-control strength, emotional eating style). At the end of the first visit, participants were handed over a booklet of questionnaires which had to

be filled in at evenings before bedtime for 14 consecutive days. Participants received an email or text message each day to help them remember to fill in the questionnaires. In addition, the students who contacted the participants visited the participant at home a second time after one week and a third time at the end of the study to give participants the opportunity to ask questions about the ongoing diary questionnaires. This ensured maximal participation of all participants. Only two participants were removed from the analyses because they failed to fill in the questionnaire for two weeks. In total, there were 2% missing values in the data. By default, these missing values are treated as structural missing values by MlWin, the statistical package we used to analyze the data.

Questionnaires

Body mass index (BMI). Participants reported their height and weight. Based on this information, BMI was calculated with the formula [weight in kg/(2*length in m)].

Emotional eating. Emotional eating was assessed with the Dutch Eating Behaviour Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). Participants indicated on a scale from 1 (*never*) to 5 (*very often*) how often they eat in response to emotions such as anger, anxiety, and restlessness (e.g., "If you feel disappointed, would you like to eat something?", 13 items). The items were scored such that a higher score represented a stronger tendency to eat in response to these emotions. Cronbach's alpha was .92.

General self-control strength. To assess general self-control strength a selection of 11 out of 13 items of the Self-Control Questionnaire (Tangney et al., 2004) was used. The questionnaire intends to measure individual differences in the disposition to control impulses, thoughts and emotions and to suppress undesirable behaviour (Finkenauer, Engels, & Baumeister, 2005). The selection of items was based on the study by Finkenauer et al. (2005) who translated the items in Dutch. Participants

responded on a scale from 1 (*completely disagree*) to 5 (*completely agree*) on items such as "I'm good at resisting temptations" and "I find it difficult to break with bad habits". As most items were negatively worded, we created a composite score with higher scores indicating a stronger lack of general self-control strength. Cronbach's alpha was .71.

Daily psychological needs. To measure daily satisfaction and frustration of the needs for autonomy, competence, and relatedness, we used a measure developed by Sheldon and Gunz (2009). Participants rated on a scale from 1 (*not at all true*) to 5 (*very true*) whether they felt their needs for autonomy (e.g. "Today my choices were based on my true interests and values" or "Today I had a lot of pressures I could do without"), competence (e.g. "Today I was successfully completing difficult tasks and projects" or "Today I struggled doing something I should be good at") and relatedness (e.g. "Today I felt close and connected to people who are important to me" or "Today I felt lonely") were satisfied or frustrated during the day. This daily assessments of needs consisted of 18 items, that is, 6 items per need, 3 of which tapped into satisfaction and 3 of which tapped into frustration of the psychological needs. Reliabilities (Cronbach's alpha) were calculated at each measurement time and for each separate need as well as for the aggregated measures of need satisfaction and need frustration. The aggregate measures had average reliabilities of .85 (range .79-.88) for need satisfaction and .79 (.74-.84) for need frustration. Satisfaction of the needs for autonomy, competence and relatedness had respective reliabilities of .75 (.70-.79), .77 (.69-.84), and .85 (.79-.89), whereas frustration of these needs had respective reliabilities of .67 (.56-.77), .72 (.69-.77), and .58 (.48-.70). Although most measures had sufficient reliability, the effects of relatedness frustration should be interpreted with some caution as Cronbach's alpha revealed relatively low internal consistency on some days.

Binge eating symptoms. The bulimia-scale of the Dutch version (Van Strien, 2002) of the Eating Disorder Inventory (EDI; Garner, 1991) was used to assess binge eating symptoms. The bulimia subscale assesses

"the tendencies to think about and engage in bouts of uncontrollable overeating" (Garner, 1991, p. 5). One item was not included in the computation of the scale score ("i.e. "I have thought of trying to vomit in order to lose weight") since we were mainly interested in binge eating rather than compensatory bulimic behaviours (see also Woods, Racine, & Klump, 2010). Further, we adapted the remaining 6 items to capture the daily experiences of participants by adding 'today' before each item. Participants responded on a scale from 1 (*not at all*) to 6 (*very much*) to items such as "Today I stuffed myself with a lot of foods" and "Today I had episodes of eating in which I felt like I could not stop eating" . The scale had an average reliability of .83 (.77-.87).

Plan of Analysis

This study has a repeated measurements design with 14 measurement times (Level 1) being nested within 302 persons (Level 2). To investigate daily variations within persons, the hierarchical structure of the data needs to be taken into account as large dependencies within persons can be expected. Also, some of our research questions require simultaneously analyzing information at the between-person and within-person level. Therefore, multilevel analysis was considered the most appropriate technique. All analyses were performed with the statistical software package MlWin 2.02 and all predictor variables were centered around their grand mean to facilitate convergence and interpretation of the models.

Prior to investigating our hypotheses, we examined whether there was significant variability in binge eating symptoms on a daily basis. A null model with random intercepts and a constant as the only predictor was created for this purpose. This model decomposed the total variation into variation at the between-person and within-person levels and served as a baseline model against which other models were compared.

Then, we proceeded by examining whether the aggregated scores of need satisfaction and need frustration were related to binge eating symptoms

(Hypothesis 1). Next, need satisfaction and frustration were further decomposed into their respective subcomponents of autonomy, competence, and relatedness to test unique associations between the three needs and binge eating symptoms (Hypothesis 2). In each model we started with a random intercepts model only and then gradually included random effects at Level 1 and Level 2. In all models reported in Table 1, we controlled for significant random effects at both levels of analyses (as indicated by likelihood-ratio tests and by chi-square tests).

For the second aim, we first tested whether there was significant variation between persons in the association between the needs and both outcomes and second, whether BMI, educational level and/or age had to be included as background variables. Then, we examined the moderating role of general self-control strength (Hypothesis 3) and an emotional eating style (Research Question 1) on the association between the needs and eating behaviours.

Finally, we investigated whether significant associations within days also 'carried on' to the next day. First, we ran prospective lagged models in which the psychological needs were entered as predictors of levels of binge eating symptoms the next days and vice versa (Research Question 2). Second, we ran lagged models again in which we additionally controlled for the level of basic need frustration and binge eating symptoms the previous day. These models allowed us to investigate whether need frustration one day predicts increases in binge eating symptoms the next day and vice versa (Research Question 3).

Results

Aim 1: Within-day Associations between Psychological Needs and Binge Eating Symptoms

In a first step, the null model with random intercepts indicated significant variability in binge eating symptoms at the within-person level [χ^2 (1) = 964.514, $p < .001$] and at the between-person level [$\chi^2(1) = 132.163$, p

< .001]. Specifically, 52% of the variance was attributed to between-person differences, whereas 48% was attributed to within-person differences. In other words, in addition to significant variation between participants in binge eating symptoms, there were significant fluctuations from day to day in these symptoms within persons. This finding indicated that it is necessary to take into account the hierarchical structure of the data and, hence, to use a multilevel approach.

Second, the aggregated measures of need satisfaction and need frustration were entered into the equations to test Hypothesis 1 (Model 1 in Table 1). Results indicated that need frustration had a significant positive association with binge eating symptoms [$\chi^2(1) = 50.749$, $p < .001$], whereas need satisfaction was unrelated to binge eating symptoms [$\chi^2(1) = 0.585$, *ns*]. After excluding need satisfaction from the model, the fit did not deteriorate [$\chi^2(1) = 0.190$, *ns*] which further indicates that need satisfaction does not yield additional information above need frustration. For every standard deviation (i.e., SD = 0.672) above the overall mean in need frustration, there was an average increase of 0.116 points on the 1 to 6 scale of binge eating symptoms. The model explained 15% of the within-person variance in binge eating.

Next, we decomposed the need frustration composite score into its subcomponents of relatedness, autonomy and competence frustration (Model 2 in Table 1), which allowed us to investigate Hypothesis 2. After controlling for significant random effects at both levels of analysis, a positive fixed effect of relatedness [$\chi^2(1) = 24.388$, $p < .001$], autonomy [$\chi^2(1) = 5.707$, $p < .05$] and competence [$\chi^2(1) = 7.342$, $p < .01$] frustration on binge eating symptoms was found. On average, one standard deviation above the mean in relatedness (SD = 0.859), autonomy (SD = 0.886) and competence (SD = 0.789) frustration was associated with an increase of 0.061, 0.024, and 0.038 points (in the 1 to 6 scale) in binge eating symptoms. This model explained 35% of the within-person variance in binge eating symptoms. In other words, the decomposition into the three separate needs

explained an additional 20% of the within-person variance in binge eating symptoms. However, the fit of this model was lower compared to the previous model. For this reason and to limit the number of parameter estimates, we proceeded with the composite measure of need frustration when examining the potential moderating role of emotional eating and self-control.

Aim 2: Main and Moderation Effects of General Self-Control Strength and Emotional Eating

Aim 2 involved testing between-person differences in the association between need frustration and binge eating symptoms. Results indicated significant variation in the slope between participants [$\chi^2(1) = 22.095$, $p < .001$], meaning that the strength of the association between need frustration and binge eating symptoms varied across women. Then, we tested the main and moderation effects of three background variables, that is, BMI, age, and educational level. No main or moderation effects for BMI [χ^2 (1) = 1.71, *ns;* χ^2 (1) = 1.678, *ns*], age [χ^2 (1) = 0.859, *ns;* χ^2 (1) = 2.295, *ns*] and educational level [χ^2 (1) = 2.835, *ns;* χ^2 (1) = 0.136, *ns*] were found. Therefore, these background variables were not included in the subsequent analyses investigating low-self control strength and emotional eating style.

Low self-control strength had a positive association with binge eating symptoms [χ^2 (1) = 10.111, $p < .01$], but no moderation effect was found [χ^2 (1) = 0.235, *ns*]. Women with lower self-control strength experienced more binge eating symptoms throughout the 14 days of measurement, but the association between daily need frustration and daily binge eating symptoms was not more pronounced compared to women with higher self-control strength. The fit of this model was significantly better compared to the model with need frustration as the only predictor [χ^2 (1) = 10.984, $p < .001$].

Next, emotional eating style was entered into the equations. An emotional eating style had a significant main effect [χ^2 (1) = 46.838, $p <$

.001] and was also a significant moderator of the need frustration – binge eating symptoms association [$\chi^2(1) = 22.588$, $p < .001$]. The main effect indicated that emotional eaters experienced more binge eating symptoms across days. To interpret the moderation effect, a graph was plotted of the fixed effects in which the average binge eating symptoms score was calculated for participants with a low (Mean -1SD) or high (Mean +1SD) emotional eating style in combination with a low (Mean -1 SD) or high (Mean + 1SD) need frustration score (see Figure 1). This plot demonstrated that the association between need frustration and binge eating symptoms was stronger for women high on emotional eating. The inclusion of emotional eating as a predictor yielded a decrease of 28.6% of the variance in the slopes and resulted in a significantly better fit compared to the model with need frustration only [$\chi^2(1) = 48.668$, $p < .001$].

Supplementary Analyses

Follow-up analyses indicated mutual prospective associations between need frustration and binge eating symptoms across days. If need frustration was higher one day, the level of binge eating symptoms the next day was also higher and vice versa. More specifically, for every standard deviation above the overall mean in need frustration on one day, there was an average increase of 0.035 points on the 1 to 6 scale of binge eating symptoms the next day [$\chi^2(1) = 4.498$, $p < .05$]. Conversely, a unit increase (SD = 0.604) in binge eating symptoms on one particular day was associated with an increase of 0.120 in need frustration the next day [$\chi^2(1) = 28.995$, $p < .001$].

The association between need frustration and binge eating symptoms remained significant after controlling for baseline levels of both variables [$\beta = 0.240$, $\chi^2(1) = 72.938$, $p < .001$]. This indicates correlated change in which within-person change in need frustration is associated with within-person change in binge eating symptoms.

Next, we examined cross-lagged relationships between need frustration and binge eating symptoms in which we additionally controlled for the level of need frustration and binge eating symptoms the previous day. These models demonstrated that need frustration one particular day could not predict increases in binge eating symptoms the next day [β = -0.013, $\chi^2(1) = 1.278$, *ns*]. Similarly, binge eating symptoms on one particular day could not predict increases in need frustration the next day [$\beta = 0.017$, $\chi^2(1) = 0.755$, *ns*]. However, the association between change in need frustration and change in binge eating symptoms remained significant after controlling for baseline levels of both variables [$\beta = 0.240$, $\chi^2(1) = 72.938$, $p < .001$]. This indicates correlated change in which within-person change in need frustration is associated with within-person change in binge eating symptoms.

Discussion

In contemporary Western society many women experience problems with adequately regulating their eating behaviours. Although there are substantial and relatively stable differences between persons in the degree to which one is prone to binge eating, there also exists considerable fluctuation within people's own eating behaviours. Investigating variables that account for these daily fluctuations might result in a more thorough and dynamic insight in eating regulation. Such insight might, in turn, provide important information about how people can be supported to remain in control over their eating. In the current study, we investigated (a) whether day-to-day variation in the satisfaction of one's basic psychological needs, as defined within Self-Determination Theory (Deci & Ryan, 2000) is implicated in one's daily binge eating symptoms and (b) whether general self-control strength and emotional eating, apart from yielding a main effect, play a moderating role in these daily associations. By considering predictors from a more general social-psychological framework (i.e., psychological needs) in conjunction with well-studied predictors in the eating regulation literature

(i.e., emotional eating; self-control), we aimed to help bridge the gap between both literatures.

Basic Psychological Needs as Processes Involved in Day-to-Day Eating Regulation

A central tenet within SDT is that people have inherent psychological needs for autonomy, competence, and relatedness. Satisfaction of these needs has been mostly studied in relation to well-being, with studies demonstrating systematically that satisfaction of these needs is associated with more well-being, both at the between-person (e.g., Vansteenkiste, Lens, Soenens, & Luyckx, 2006) and within-person level (e.g., Reis et al., 2010). Although some studies documented associations between the psychological needs and eating behaviours (e.g. Schüler & Kuster, 2011), no previous studies investigated these associations at the within-person level. In line with Hypothesis 1, we found that women experienced more binge eating symptoms on days their needs had been frustrated. This finding suggests that previously documented associations between the psychological needs and eating behaviour outcomes (e.g., Thogerson-Ntoumani et al., 2010; Schüler & Kuster, 2011) also apply at the within-person level.

The finding that need frustration, but not need satisfaction, was associated with binge eating symptoms also has relevance for a recent development in SDT. Recent studies within SDT indicate that a lack of need satisfaction is not the same as need frustration and that especially need frustrating experiences are associated with pathological outcomes (e.g., Bartholomew et al., 2011; Sheldon, Abad, & Hinsch, 2011; Verstuyf et al., 2012). The current study adds to these findings by extending them to the within-person level.

A set of ancillary analyses revealed significant prospective associations between need frustration and binge eating symptoms. This means that need frustration is not only associated with binge eating symptoms the same day, but also with levels of binge eating symptoms the next day. Conversely,

binge eating was related to experiences of need frustration the next day. However, need frustration one day could not predict an increase in binge eating symptoms the next day after controlling for baseline levels of both variables. Changes in need frustration were significantly related to changes in binge eating symptoms. This finding indicates that, for instance, an increase in need frustration from day 1 to day 2 is associated with an increase in binge eating symptoms from day 1 to day 2. Together, these findings suggest that the association between need frustration and binge eating symptoms is a dynamic one. Although more research is needed to examine the direction of effects involved, it seems that need frustration and binge eating are developing in tandem from one day to the next.

There are several explanations as to why need frustration is related to binge eating behaviours on a daily basis. For instance, previous diary studies (e.g., Ryan et al., 2010) indicated that daily need satisfaction is associated with more subjectively felt energy (i.e., vitality). Therefore, on need-frustrating days one might feel depleted of energy such that one loses control over eating more easily. Another explanation is that uncontrollable eating might be a way to cope with the negative affect associated with need frustrating experiences. More research is needed to investigate these explanatory mechanisms.

Further, to test Hypothesis 2, we decomposed the aggregate measure of need frustration into its three subcomponents, that is, the needs for autonomy, competence and relatedness. We found unique associations of each of the three needs, which is consistent with diary studies on need satisfaction and wellbeing (e.g., Reis et al., 2000; Ryan et al., 2010). The finding that relatedness frustration was strongly associated with binge eating symptoms is in line with results of experience-sampling studies which found that poorer social experiences and negative family interactions precede binge-eating in clinical samples (Steiger et al., 2005; Okon et al., 2003). To our knowledge, no previous study has demonstrated the additional role of

autonomy and competence frustration in the prediction of daily binge eating behaviours.

General Self-Control Strength and Emotional Eating Style as Individual Characteristics

An additional aim was to investigate whether two individual characteristics, that is, general self-control strength and an emotional eating style, moderate the associations between the needs and binge eating behaviours. Preliminary analyses revealed that the strength of the association between need frustration and binge eating symptoms varied across persons. This opened the possibility for individual characteristics to explain these between-person differences.

As for Hypothesis 3, findings showed that persons who had rather low general self-control strength experienced more binge eating symptoms across days. This finding is in line with self-control theory (Baumeister & Heatherton, 1996) and with previous findings that people with relatively more self-control strength display a healthier diet (e.g., Tangney et al., 2004). In contrast to our expectations, general self-control strength did not moderate the relation between the needs and binge eating symptoms. This finding is inconsistent with previous studies that yielded indirect support for this moderation hypothesis (e.g., Schüler & Kuster, 2011; O'Connor et al., 2009). There are several possible explanations for these different results, both conceptually and methodologically. For instance, Schüler and Kuster used a cross-sectional design in their study and operationalized self-control strength through achievement motivation. Also, O'Connor et al. (2009) measured conscientiousness rather than self-control strength. Although achievement motivation and conscientiousness share some conceptual overlap with self-control strength, there also remain important conceptual and measurement differences. Future studies could shed more light on these contradictory results.

We investigated main and moderating effects of an emotional eating style in a rather explorative fashion. We found that people with an emotional eating style experienced more binge eating symptoms across the days. Apart from this main effect, the daily association between need frustration and binge eating symptoms was stronger for women with an emotional eating style. This finding is in line with laboratory studies that demonstrated that negative affect causes disinhibited eating in participants with an emotional eating style (e.g., Loxton, et. al., 2011; study 1) and with the diary study of O'Conner et al. (2008). In the latter study, it was found that emotional eating is the most pre-eminent individual characteristic to understand the associations between daily hassles and snacking behaviours.

The finding that emotional eating plays a moderating role suggests that the association between need frustrating experiences and binge eating symptoms is especially strong for women with a tendency to eat as a coping mechanism with negative feelings. This might suggest that the negative affect associated with need frustrating experiences can help explain the association between need frustration and binge eating symptoms. In other words, need frustrating experiences might be associated with binge eating symptoms because emotional eaters tend to indulge in overeating as a strategy to cope with negative feelings arising from need frustrating experiences. This is in line with some prevailing theories on binge eating, such as the escape-of-awareness theory (Heatherton & Baumeister, 1991) and expectancy theory (Hohlstein, Smith, & Atlas, 1998). Whereas the first theory states that binge eating can function as a mechanism to escape awareness after threatening experiences, the second theory states that binge eating is associated with negative affect because people believe that eating will reduce their negative feelings. Both theories suggest that binge eating is in fact a motivated attempt to deal with negative emotions. These ideas share some overlap with the more global hypothesis within SDT that need frustration will translate into 'need substitutes'. The notion of need substitutes implies that, following need frustration, people try to re-establish

fulfillment of their needs in a maladaptive and derivative way. Specifically, people may look for short-cuts that seem to provide immediate satisfaction but that, in reality, do not provide deep and long-lasting need satisfaction. Binge eating may represent one such derivative need substitute that people engage in after need frustrating experiences (see Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012).

Limitations and Suggestions for Future Research

Although our study has revealed several important findings, there are also some methodological and conceptual limitations. First, although we followed participants for 14 consecutive days, our analyses do not allow for conclusions about causality or direction of the effects within the day. Although we assume that need satisfying or frustrating experiences precede binge eating symptoms within a particular day, the opposite direction might be equally plausible. Indeed, our additional prospective analyses revealed mutual associations in which need frustration was associated with binge eating symptoms the next day, but, also binge eating symptoms were associated with need frustration the next day. Second, although diary methods allow for investigating the dynamics involved in eating regulation in an ecologically valid way, experience-sampling studies allow for a closer observation of the sequence of within-day processes. In that case participants fill in the questionnaires at several random moments during the day, which strongly diminishes recall effects. Another limitation to the research design is that individuals may, to some extent, be reactive to the process of self-monitoring (e.g., Rutledge, Groesz, Linke, Woods, & Herbst, 2011). The fact that participants filled out a questionnaire about their eating behaviours each day, may have changed their eating behaviours and, thus, eating behaviours perhaps were not representative to their general eating behaviours. A third methodological limitation is that relatedness frustration had low reliabilities at some measurement times. Accordingly, we should be careful with our interpretation of these results. Further, all measures were self-reported. For

some measures, such as weight and height, this way of collecting data can undermine validity. It is recommended for future research to build on the present findings by relying on observations and multi-informant assessments.

In addition to these methodological limitations, there are also some conceptual limitations. For instance, although we speculate that the associations between the psychological needs and eating behaviours can be accounted for by negative affect and depletion of energy, these specific mechanisms were not measured. It would be interesting to test these mediating path models in a within-person design. Also, all our participants were female adolescents or young adults. The inclusion of a broader age range might result in different findings. Also, in light of the fact that men are also prone to binge eating symptoms (Goossens & Braet, 2010; Striegel-Moore et al., 2009), it is equally interesting to investigate whether experiences of need satisfaction and need frustration are implicated in men's eating regulation. In addition to a broader age group and including both genders, it would be interesting to replicate this study in a clinical sample of eating disorder patients. A final conceptual limitation is our exclusive focus on binge eating behaviours. It would be interesting to investigate healthy eating behaviours in addition to unhealthy eating behaviours. Although need satisfaction was unrelated to binge eating symptoms, it may be implicated in one's eating behaviours by its influence on healthy eating behaviours. Further, although the domain of eating regulation is relevant for many female youngsters, inclusion of other self-regulatory behaviours and contexts could have resulted in a broader picture of what is going on in the daily life of these youngsters. For instance, rather than experiencing binge eating symptoms, some youngsters might drink more alcohol or spend excessive time on the internet on need frustrating days.

Clinical and Theoretical Implications of the Study

Despite these limitations, we believe our study has some important theoretical and clinical implications. Our study has revealed that, in addition to between-person variation, there is considerable variation within persons in binge eating symptoms. Thus, a one-time measurement of people's traits and eating behaviours is only a 'snapshot' of the dynamics in daily life, but fails to capture the entire film. Investigating the dynamics in eating regulation over time allows for including within-person predictors in addition relatively more stable trait-differences. Further, our study revealed that previously documented between-person associations between the psychological needs and eating behaviours also apply at the within-person level. Finally, our study indicated that especially women with an emotional eating style are vulnerable to experience binge eating symptoms on need frustrating days.

The finding that there is considerable within-person variability is also of major clinical importance. It indicates that, although there are stable differences between women, variability in eating patterns can be observed depending on other experiences throughout the day. Professionals who guide women in their attempts to regulate their eating behaviours can more thoroughly address the within-time fluctuations in problematic behaviours and improve skills to deal with the more difficult days. The associations between the psychological needs and eating regulation suggests that health care providers can help adolescents control their eating behaviours by increasing awareness about need frustrating experiences. For instance, when one is aware of need frustrating experiences, one could try to minimize or meaningfully integrate such experiences and find tools to cope with need frustrating experiences in a constructive rather than derivative fashion. Finally, our study suggests that it would be useful to target emotional eaters, as these adolescents in particular tend to lose control over eating on need frustrating days.

Table 1

Overview of multilevel models for binge eating symptoms

	Null model	Model 1	Model 2	Model 3	Model 4
Fixed effects					
Overall Intercept	1.313 (0.026)	1.301 (0.023)	1.306 (0.025)	1.301 (0.023)	1.298 (0.022)
Person level					
Selfcontrol				0.141 (0.043)***	
Selfcontrol*Need frustration				0.019 (0.030)	
Emotional eating					0.191 (0.028)***
Emotional eating*Need frustration					0.091 (0.019)***
Day level					
Need satisfaction		-0.009 (0.016)			
Need frustration		0.116 (0.016)***		0.114 (0.016)***	0.112 (0.016)***
Relatedness frustration			0.062 (0.012)***		
Autonomy frustration			0.025 (0.011)*		
Competence frustration			0.037 (0.014)**		
Random effects	Null Model	Model 1	Model 2	Model 3	Model 4
μ_{0J}	0.189 (0.016)*	0.147 (0.013)***	0.160 (0.014)***	0.142 (0.013)***	0.126 (0.011)***
μ_{1J}			0.016 (0.003)***	0.028 (0.006)***	0.023 (0.006)***
μ_{2J}		0.029 (0.006)***			
μ_{3J}			0.014 (0.004)***		

Table 1 *(continued)*

μ_{0J} μ_{1J}		0.035 (0.007)***	0.027 (0.005)***	0.034 (0.007)***	0.025 (0.006)***
μ_{0J} μ_{2J}					
μ_{0J} μ_{3J}			0.020 (0.006)***		
e_{0J}	0.175 (0.004)*	0.150 (0.004)***	0.114 (0.004)***	0.150 (0.004)***	0.150 (0.004)***
e_{1J}				0.041 (0.008)***	0.040 (0.008)***
e_{2J}		0.040 (0.008)***			
e_{3J}			0.025 (0.005)***		
$e_{0J}e_{1J}$				0.066 (0.004)***	0.066 (0.004)***
$e_{0J}e_{2J}$		0.066 (0.004)***			
$e_{0J}e_{3J}$			0.036 (0.002)***		
2*log likelihood	5464.463	4706.486	4774.676	4695.502	4657.818
χ^2 (df)		125.958(1)***	- 68.19(3)	10.984(1)***	48.668(1)***

Note 1: * $p < .05$; ** * $p < .01$; *** $p < .001$. Non significant random effects were excluded from the models.

Note 2: Random effects at the between-person level: μ_{0J} (amount of between-person variation) , $\mu_{1J,}$ μ_{2J} and μ_{3J} (amount of between-person variation in slopes predictor 1, 2 and 3), μ_{0J} μ_{1J}, μ_{0J} μ_{2J} and μ_{0J} μ_{3J} (covariation between intercept outcome and slopes predictors 1, 2 and 3 at the between-person level). *Random effects at the within-person level:* e_{0J} (amount of within-person variation) , e_{1J}, e_{2J} and e_{3J} (amount of within-person variation in slopes predictor 1, 2 and 3), e_{0J} e_{1J}, e_{0J} e_{2J} and e_{0J} e_{3J} (covariation between intercept outcome and slopes predictor 1, 2 and 3 at the within-person level).

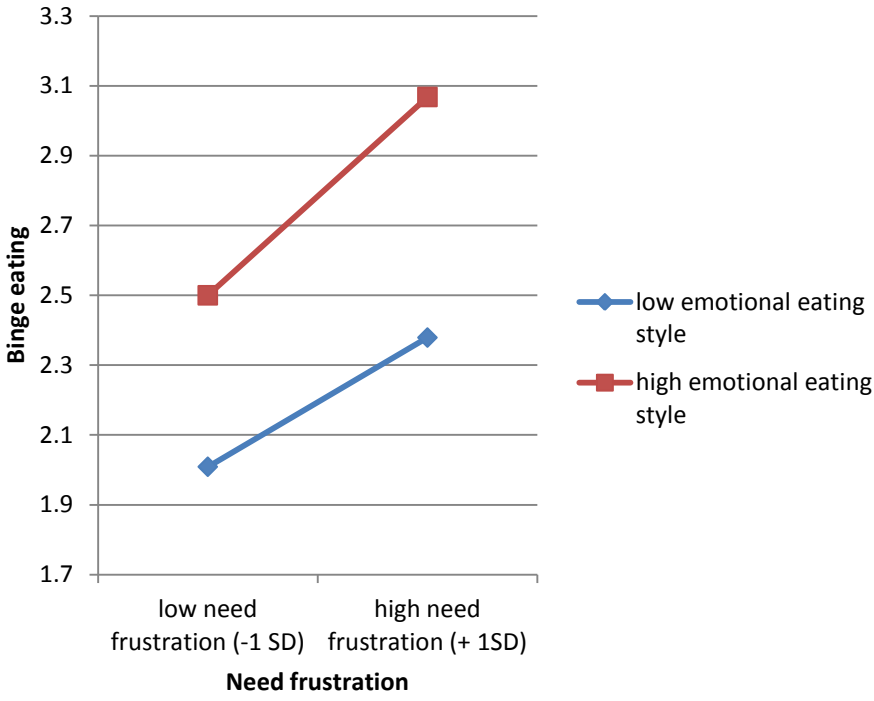

Figure 1. Plot of interaction effect between emotional eating and need frustration in the prediction of binge eating symptoms

Chapter 7

The Body Perfect Ideal and Eating Regulation Goals: Investigating the Role of Adolescents' Identity Styles[1]

Adolescents are exposed to images depicting the thin or muscular ideal almost on a daily basis. When the body perfect ideal is adopted, adolescents are at increased risk for developing unhealthy and disordered eating behaviours. The aim of the current 3-wave longitudinal study among adolescents (N = 418; 54% girls) was to investigate whether different styles of identity exploration (i.e., information-oriented, normative, and diffuse-avoidant) are associated differentially with changes in adoption of the body perfect ideal, which, in turn, would relate to changes in appearance-focused and health-focused eating regulation. Results indicated that the information-oriented style predicted decreases and the normative style predicted increases in adoption of the body perfect ideal. In turn, adoption of the body perfect ideal predicted significant increases in appearance-focused eating regulation but not in health-focused eating regulation. A diffuse-avoidant style was unrelated to changes in adoption of the body perfect, yet directly predicted decreases in health-focused eating regulation. Theoretical and clinical implications of these findings are discussed.

[1] Verstuyf, J., Van Petegem, S., Vansteenkiste, M., Soenens, B., & Boone, L. (in press). The body perfect ideal and eating regulation goals: Investigating the role of adolescents' identity styles. *Journal of Youth and Adolescence.* doi: 10.1007/s10964-013-9949-x.

Introduction

Adolescence is a transitional life period during which youngsters learn to think and decide more independently from their parents, thereby attempting to choose a clear and personal direction in life (Steinberg & Morris, 2001). A central developmental task during this period involves the construction of a solid and stable identity (Erikson, 1968). One important feature of identity development is the selection of goals and values that constitute one's identity (Soenens & Vansteenkiste, 2011).The goals adolescents can pursue vary from including building close relationships with peers, contributing to society (e.g., through youth movement or volunteer organizations) to gathering the most up-to-date technological gadgets. One goal that is particularly emphasized in current western society is the pursuit of a physically attractive body (e.g., Slater, Tiggemann, Hawkins, & Werchon, 2012). Looking attractive is highly valued and standards for beauty have become extreme and unattainable for most people (Dittmar, 2007). Indeed, sociocultural messages that are spread through television and magazines encourage women to be extremely thin, whereas men are encouraged to develop a lean and muscular body (Ricciardelli & McCabe, 2004; Slater, et al., 2012). Adolescents do not only differ, however, in the type of goals they adopt (i.e., the "what" of identity) but also in the style they use to explore and construct their identity (i.e., the "how of identity") (Berzonsky, Macek, & Nurmi, 2003). Importantly, recent research shows that the what and the how of identity development are not orthogonal and that adolescents' identity styles are predictive of the type of goals they adopt (e.g., Berzonsky, Cieciuch, Duriez, & Soenens, 2011; Duriez, Luyckx, Soenens, & Berzonsky, 2012). Against the background of this research, it can be argued that, depending upon their identity style, youngsters might be more or less likely to buy into the sociocultural encouraged goal of physical attractiveness.

The message spread by consumer culture is that the attainment of the body perfect ideal (i.e., the thin-ideal for women and the muscular ideal for

men) is key to a successful and happy life (Evans, 2003). The majority of adolescent girls, but also an increasing percentage of boys, indicate that they regulate their food intake to change their appearance (Cafri et al., 2005; Davison, Markey, & Birch, 2000). Unfortunately, eating regulation can be a risk factor for disordered eating (Polivy & Herman, 1985; Stice, 2001). Recent studies have found that adolescents' eating regulation can be driven by different goals that relate differentially to disordered eating (Verstuyf, Vansteenkiste, & Soenens, 2012). Specifically, when eating regulation is driven by the goal to alter one's appearance, it relates to extreme weight loss behaviours and disinhibited eating. In contrast, such associations were not found when eating regulation is driven by the goal to become healthier (Putterman & Linden, 2004; Verstuyf, Vansteenkiste, et al., 2012). Given these findings, it seems particularly important to investigate antecedents of appearance-focused eating regulation. The aim of the present contribution was to examine whether adolescents' style of exploring different identity options (Berzonsky, 1990) would render adolescents differentially prone for adopting the body perfect ideal, which, in turn, would relate to appearance-focused eating regulation. Although it has been argued at the theoretical level that problems during identity development might be implicated in the adoption of the body perfect ideal and disordered eating behaviours (e.g., Dittmar, 2007), little empirical work has been undertaken that bridges the identity literature with the literature on adoption of the body perfect ideal and eating regulation. This was precisely the broader aim of the present contribution.

The Process of Identity Exploration: Identity Styles

Several aspects of one's identity can be discerned (Suh, 2002), including one's relational, collective (e.g., ethnic) and personal identity (Vignoles, Schwartz, & Luyckx, 2011). In the present contribution we focus on personal identity development. In the literature on personal identity development, two frameworks have attracted a lot of attention, that is,

Marcia's identity status paradigm (Kroger, Martinussen, & Marcia, 2010; Marcia, 1966) and Berzonsky's identity styles model (Berzonsky, 1990; Berzonsky & Adams, 1999; Berzonsky, et al., 2011). In the identity status paradigm, four identity statuses are distinguished based on the combination of two central dimensions of identity development, that is, adolescents' exploration of different possible identities and adolescents' commitment to certain goals or values. Although this paradigm has been very valuable in the study of identity development in adolescence (for a review, see e.g., Kroger, et al., 2010), it has been criticized for its primary focus on the outcome rather than the process of identity development (van Hoof, 1999). To deal with the criticism, Berzonsky (Berzonsky & Adams, 1999) focused more on the dynamics and processes underlying identity exploration. Specifically, Berzonsky's model addresses the question how identity is explored, constructed, changed, and maintained. Berzonsky (1990) distinguished between three social-cognitive styles that describe how adolescents explore identity-relevant information, how they deal with personal problems, and eventually make identity-relevant choices. First, the *information-oriented* identity style is characterized by an active and critical approach to identity-relevant information. Adolescents relying on this style explore a wide range of values and goals and gather as much information as possible before deciding on which goals are prioritized. Because of their active exploration and their openness for change, they tend to regularly evaluate their chosen identity and, if necessary, they accommodate it. Individuals adhering to this identity style typically define themselves in terms of personally held goals and values (Berzonsky, et al., 2003). The result of such an approach is a coherent, differentiated, and relatively flexible identity (Soenens, Duriez, & Goossens, 2005).

Second, adolescents making use of the *normative style* rely primarily on others when dealing with identity-relevant information. Rather than actively exploring which goals matter to them personally, they conform to expectations and norms of significant others or groups. Normative

individuals tend to define themselves in terms of collective considerations, such as family, religion or nationality (Berzonsky, et al., 2003). They typically ignore or suppress any identity-relevant information that is incongruent with socially expected goals and values (e.g., Soenens, et al., 2005). Instead, they assimilate identity-relevant information into already existing self-representations. The result of such an identity style is a firmly held, yet, rather rigid and undifferentiated identity (Pittman, Kerpelman, Lamke, & Sollie, 2009).

Finally, the *diffuse-avoidant* style is characteristic of adolescents who tend to avoid making identity-related decisions. Youngsters with a diffuse-avoidant style avoid and procrastinate engagement in thorough identity-related exploratory work. They postpone to gather information and to take a decision until they are forced by the situation. As a result, their choices are generally dictated by external circumstances rather than by internally valued goals. In other words, no stable commitments to goals and values are made and choices and behaviours vary from situation to situation in a chameleon-like fashion (Berzonsky & Ferrari, 1996). Commitments held by adolescents with a diffuse-avoidant style, if any, are volatile and are quickly accommodated to shifting situational circumstances. The result of this identity style is a rather diffused identity status (Berzonsky, et al., 2011; Pittman, et al., 2009). Because of this diffusion, external or social indicators of identity, such as reputation, popularity and impression management, become more important (e.g., Berzonsky, 1990).

Previous research indicated that the identity styles are differentially related to well-being and adjustment. For instance, the information-oriented style is associated with active coping, a sense of meaning in life, and personal well-being (Pittman, et al., 2009; Soenens, et al., 2005). The normative style is usually unrelated or positively related to personal well-being, yet also to more problematic interpersonal orientations, such as prejudice and relational aggression (Duriez & Soenens, 2006; Smits, Doumen, Luyckx, Duriez, & Goossens, 2011; Soenens, et al., 2005). Finally,

the diffuse-avoidant style has been related to indicators of ill-being (e.g., depressive symptoms, Nurmi, Berzonsky, Tammi, & Kinney, 1997) and to problem behaviours (e.g., conduct disorders, Adams et al., 2009). The relation between the identity styles and eating behaviours has not been studied systematically in previous research. Nevertheless, there are reasons to assume that each of these three identity styles can relate differentially to individuals' body image and eating behaviours.

Identity Styles and Dynamics of the Body Perfect Ideal

The body perfect ideal as a substitute for an identity vacuum: The diffuse-avoidant style. The diffuse-avoidant style seems most directly relevant to the dynamics of adopting the body perfect ideal. For instance, it has been argued by a number of scholars that problematic eating behaviours might develop in the face of an identity vacuum. Wheeler and colleagues (Wheeler, Wintre, & Polivy, 2003, p. 406) stated that "… the obsessive concern with weight and food issues in disordered eaters provide a means to help the vulnerable young women to evade the effort to define the goals and values of a self-directed identity in a world where she perceives no support for doing so". Empirical research investigating this hypothesis is scarce. A handful of studies have found cross-sectional associations between feelings of identity confusion (Schupakneuberg & Nemeroff, 1993; Vartanian, 2009; Weinreich, Doherty, & Harris, 1985) or the diffuse-avoidant identity style (Wheeler, Adams, & Keating, 2001; Wheeler, et al., 2003) and disordered eating behaviours, specifically bulimic and binge-eating pathology. These findings suggest that binge eating behaviours may be used as a way to cope with the identity vacuum individuals may experience. These findings are also in line with Berzonsky's argument that diffuse-avoidant individuals often exhibit impulsive behaviours and use maladaptive emotional coping strategies to release the tension they face (Berzonsky & Ferrari, 1996).

In a similar way, individuals with a diffuse-avoidant style might adopt the body perfect ideal as a way to cope with the identity vacuum they

experience (Vartanian, 2009). In current society, youngsters are exposed to a staggering amount of commercials telling them that being physically attractive should be a central life goal (e.g., Dittmar, 2007; Slater, et al., 2012). Although it is recognized that most people are influenced by this continuous exposure to some extent, it also has been argued that especially more vulnerable youngsters might internalize or adopt the body perfect ideal in an effort to define themselves (e.g., Dittmar, 2007). Rather than going to a thorough process of soul-searching and identity-exploration, these youngsters would pursue the extreme body perfect ideal in the hope that the attainment of this ideal would bring them the desired success and happiness (e.g., Evans, 2003). To date, only one cross-sectional study has examined the association between identity development and adoption of the body perfect ideal. Vartanian (2009) found that low self-concept clarity, which refers to the extent to which self-definitions are unstable and ill-defined, related to the adoption of the thin-ideal which, in turn, was associated with body image concerns and dieting behaviours. In men, no evidence was obtained for the association between a lack of self-concept clarity and adoption of the muscular ideal, although adoption of the muscular ideal predicted body image concerns and dieting behaviours among men in a similar way as adoption of the thin-ideal predicted body image concerns and dieting behaviours among women.

When others' opinion matters the most: The normative style. Although the normative identity style has, to our knowledge, not been investigated in relationship to adoption of the body perfect ideal, there are reasons to assume that also this style is related positively to adoption of the body perfect ideal. Dieting behaviours aimed at meeting societal ideals regarding attractiveness have become part of our cultural identity (Bacon, Stern, Van Loan, & Keim, 2005). Therefore, individuals with a normative identity style – who tend to follow societal norms and expectations – might be especially eager to endorse the body perfect ideal. In line with this, Duriez et al. (2012) reported in a three-wave longitudinal study bidirectional

associations between the normative identity style and the pursuit of extrinsic goals, such as image, financial success, and fame (Kasser & Ryan, 1996). The goal of pursuing the body perfect ideal closely resembles the extrinsic goal of physical attractiveness and image (Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012), as defined within Self-Determination Theory (SDT; Kasser & Ryan, 1996; Ryan & Deci, 2000). Much like the appeal of extrinsic goals lies in the anticipated power, social approval or self-esteem that would result from attaining them (Kasser, Ryan, Couchman, & Sheldon, 2004), the pursuit of the body perfect ideal is embedded in the anticipation of feelings of success, self-esteem, and social approval (Engeln-Maddox, 2006). Therefore, we expected that the normative style would be predictive of increases in adopting the body perfect ideal.

A critical look at society: The information-oriented style. Much like for the normative style, no previous studies have investigated directly the association between the information-oriented style and adoption of the body perfect ideal and eating regulation. There is, however, indirect evidence available suggesting that this style might be a protective factor against adoption of the body perfect ideal and appearance-focused dieting goals. First, intervention studies have shown that girls who were taught to take a more critical stance towards the thin-ideal were less likely to adopt this ideal which, in turn, protected them against body image and dieting concerns up to three years after the intervention (e.g., Stice, Marti, Rohde, & Shaw, 2011; Stice, Rohde, Shaw, & Gau, 2011). Second, a few correlational studies have focused on general self-determination, which reflects the regulation of one's behaviour on the basis of one's own interests and personally held values and goals and which is related to the information-oriented identity style (Soenens, Berzonsky, Dunkel, Papini, & Vansteenkiste, 2011). These studies found that general self-determination can function as a buffer against sociocultural pressures to be thin and thin-ideal adoption (Kopp & Zimmer-Gembeck, 2011; Pelletier, Dion, & Levesque, 2004; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). In

addition, in an experimental study, Mask and Blanchard (2011) showed that, after being exposed to the thin-ideal, women low in general self-determination perceived more pressure to be thin, more body dissatisfaction and more concerns over quantity of eating, whereas women high in general self-determination only reported more concerns over the quality of eating. Consistent with this small body of work, we also expected that adolescents with an information-oriented style would be less likely to adopt the body perfect ideal over time.

Adoption of the Body Perfect Ideal and Eating Regulation

The association between adoption of the body perfect ideal and dieting behaviours is well-established. A large number of methodologically and culturally diverse studies have demonstrated that adopting the thin-ideal is a risk factor for subsequent dieting behaviours in girls and women (Stice, Mazotti, Krebs, & Martin, 1998; Stice, Mazotti, Weibel, & Agras, 2000; Thompson & Stice, 2001). Compared to the numerous studies investigating the thin-ideal in women, far fewer studies have investigated the role of adoption of the muscular ideal in dieting behaviours for men. Results of these studies are more mixed (Cafri, et al., 2005), which is in part due to the different characteristics of the body perfect ideal for men. Whereas sociocultural messages suggest that women have to be thinner, men have to be more muscular and lean (Cafri, et al., 2005), which may lead them to focus on both losing weight to become thinner and gaining weight in order to gain more muscles. Appearance-focused eating regulation can serve both goals, such that men might engage in fasting periods as well as in episodes of increased eating to gain weight. Previous studies suggest that adoption of the muscular ideal is indeed related to a pattern of eating behaviours in men that is more diverse compared to women (i.e., both weight-loss and weight-gain strategies) (Cahill & Mussap, 2007; Vartanian, 2009).

Importantly, most previous studies investigated the relationship between the body perfect ideal and quantity of eating regulation as an

outcome. However, debate exists about the dangers and possible benefits of eating regulation (e.g., Westerberg-Jacobson, Ghaderi, & Edlund, 2012). Whereas some studies found positive relationships between quantity of eating regulation and disordered eating (e.g., Westerberg-Jacobson, Edlund, & Ghaderi, 2010), other studies showed that eating regulation resulted in lower levels of overeating and bulimic symptoms (e.g., Burton & Stice, 2006; Groesz & Stice, 2007). Given these mixed findings, some studies (e.g., Verstuyf, Vansteenkiste, et al., 2012) explored the question whether some types of eating regulation were less detrimental than others. In this context, it has been shown that eating regulation was more beneficial when focused on maintaining or improving health. For instance, two studies found that girls who successfully lost weight especially used healthy methods such as eating more fruit and vegetables and exercising (Boutelle, Libbey, Neumark-Sztainer, & Story, 2009; Westerberg-Jacobson, et al., 2012). Similarly, other studies found that appearance-focused goals for eating regulation were associated with binge eating symptoms and unhealthy weight control behaviours, whereas health-focused eating regulation had no such associations with disordered eating (Putterman & Linden, 2004; Verstuyf, Vansteenkiste, et al., 2012). Therefore, rather than focusing on the quantity of eating regulation as such, we differentiated between health-focused and appearance-focused eating regulation as outcomes.

The Present Study

The primary aim of the present study was to investigate whether identity styles would predict changes in adoption of the body perfect ideal which, in turn, would predict changes in appearance-focused and health-focused eating regulation. To address this research aim, we used a 3-wave longitudinal study with annual assessments. All hypotheses were tested using structural equation modeling (SEM). To ensure temporal precedence in the assessment of the three sets of constructs (i.e., identity styles, body perfect ideal, and eating regulation goals), they were each assessed at

different time points. To provide an additionally conservative test of our hypotheses and to ascertain that identity styles would predict changes in the other constructs, we controlled for T1 levels of adoption of the body perfect ideal when predicting adoption of the body perfect ideal at T2 and we controlled for T2 levels of eating regulation goals when predicting T3 eating regulation goals.

Using the above design, we addressed the following three hypotheses. First, we expected that the three identity styles would relate differentially to changes in adoption of the body perfect ideal, with the diffuse-avoidant and the normative styles predicting increases (Hypothesis 1A and 1B) and an information-oriented style predicting decreases (Hypothesis 1C) in adoption of the body perfect ideal. Second, we expected that adoption of the body perfect ideal would predict an increasing focus on appearance-focused, relative to health-focused, eating regulation (Hypothesis 2). Finally, we explored whether structural relations were similar among male and female adolescents using multi-group SEM (Hypothesis 3).

Method

Sample and Procedure

Adolescents from Grade 7 to Grade 10 of a secondary school in Flanders (Belgium) were invited to take part in the study. Parents provided informed consent for their children to participate in the study. Paper and pencil questionnaires were handed out to the adolescents, which were filled in at school in the presence of a research assistant and one teacher. Approximately one year and two years later, the adolescents were invited to participate a second and third time. Answers were connected through a unique personal code, generated during the first participation, to ensure confidential treatment of the data.

At Time 1, 418 adolescents participated in the study. Their age ranged between 12 and 17 years (mean age = 13.58 years; 45.7% male). At

Times 2 and 3, 263 (62.9% response rate) and 259 (62% response rate) adolescents, respectively, participated again. Overall, 100 adolescents participated at one single wave, 114 adolescents participated at two waves, and 204 adolescents participated at all three moments in time. Little's Missing Completely At Random Test (Little, 1988) turned out to be non-significant (normed χ^2 of 1.06; < 2), suggesting that the incomplete data are likely to be missing at random. Under such conditions, Full Information Maximum Likelihood (FIML) is the most appropriate way to deal with the missing data in SEM (Enders & Bandalos, 2001). The FIML approach uses information of all cases to compute the parameter estimates. To ensure that no bias emerged because of the FIML approach, analyses were repeated with the 204 adolescents who participated at all three measurement moments. This analysis yielded nearly identical parameter estimates as the ones reported here.

Measurement Instruments

Demographic variables. Participants reported their age, gender, educational level and height and weight. Educational level referred to the type of education (i.e., whether participants followed the general, technical, or vocational track). Most participants were in the general track (71%), followed by the technical track (27%), and vocational track (2%). Based on self-reported gender, age, height and weight, adjusted BMI scores were calculated using the Flemish Growth Charts (Roelants & Hauspie, 2004). The adjusted BMI scores at Time 1 varied between 69.27 and 163.72 (Mean = 99.98; SD = 13.39). The vast majority of participants (80.70%) were within the healthy weight range, with 9.8% of them being underweight and 6.3% being overweight (3.3% missing). The demographic variables were assessed at each time point.

Identity styles. Participants completed the Identity Style Inventory-Version 4 (ISI-4; Smits et al., 2011) at Time 1. Items were scored on a 5-point Likert scale, ranging from 1 *(strongly disagree)* to 5 *(strongly agree)*.

The ISI-4 has 3 subscales tapping into the three identity styles, that is, the information-oriented style (7 items, e.g., "When facing a life decision, I try to analyze the situation in order to understand it"), the normative style (8 items, e.g., "I strive to achieve goals that my family and friends hold for me"), and the diffuse-avoidant style (9 items, e.g., "Many times, by not concerning myself with personal problems, they work themselves out"). Cronbach's alpha was .74, .64, and .70 for the information-oriented, normative and diffuse-avoidant style, respectively, which is similar to previous research (Smits et al., 2011).

Adoption of the body perfect ideal. Three items of the Internalization Subscale of the Sociocultural Attitude Towards Appearance Questionnaire-3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) were used to assess women's recognition and acceptance of societal approved standards of appearance at Time 1 and 2. An example item is: "I would like my body to look like the models who appear in magazines". An adjusted version was used for male participants, in which wording referring to "thinness" or "thin women" were reframed as "muscularity" or "muscular men" (see also Vartanian, 2009). Each item was rated on a 7-point rating scale, ranging from 1 *(completely disagree)* to 7 *(completely agree)*. Cronbach's alphas were .80 and .72 at Time 1 and .92 and .95 at Time 2 for girls and boys respectively.

Eating regulation goals. An adapted version of the Aspiration Index (AI; Kasser & Ryan, 1996) was used to measure participants' goals for eating regulation (Verstuyf, Vansteenkiste, et al., 2012) at Time 2 and 3. Two types of goals, that is, the intrinsic goal of physical fitness and health (3 items) and the extrinsic goal of physical appeal and beauty (3 items) were assessed. After reading the stem "I regulate my food intake because...", participants indicated on a 7-point Likert scale ranging from 1 (*not at all important*) to 7 (*very important*) how strongly they valued each of the goals for regulating their eating behaviour at Time 2 and 3. Example items referring to health-focused and appearance-focused eating regulation were,

respectively, “because I want to keep fit” and “because others would find me more attractive”. Across time points and genders, Cronbach’s alphas varied between .81 and .87, with an average of .84.

Results

Preliminary Analyses

Table 1 presents descriptive statistics and bivariate correlations among the study variables. As can be noted, significant negative relationships emerged between participants’ age and the information-oriented and normative identity style and body perfect adoption at T1. Adjusted BMI was significantly positively associated to appearance-focused eating regulation at Time 2 and 3. Inspection of the correlations between our study variables revealed that an information-oriented style was associated positively with health-focused eating regulation at T2 and T3. The normative and diffuse-avoidant styles were associated positively with body perfect adoption at T1. Finally, body perfect adoption at T2 was associated positively with health-focused and appearance-focused eating regulation at T2, but only with appearance-focused eating regulation at T3.

To control for the potentially confounding effects of age and educational level, all indicators of the measurement model were regressed on these background variables and the residual scores were used as indicators in the measurement model. Adjusted BMI was entered as a time variant control variable in the structural model by allowing correlations between adjusted BMI at each time point and the study variables at the same time point and by allowing paths from adjusted BMI at each time point to the study variables of the next time point. Finally, gender was included as a control variable in the structural model and, in an additional set of analyses, was tested as moderator variable of the structural path.

Primary Analyses

Measurement model. We first created and inspected the quality of the measurement model representing the study variables as latent variables. The three identity styles were indexed by three randomly created parcels (Little, Cunningham, Shahar, & Widaman, 2002). Body perfect adoption at T1 and T2, and health-focused and appearance-focused eating regulation at T2 and T3 were represented by their respective items. Factor loadings of repeated measures were set equal over time. Fit indices used to evaluate model fit were the χ^2 test, the root-mean-square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), and the comparative fit index (CFI). Combined cut-off values of .06 or lower for the RMSEA, and .09 or lower for the SRMR are considered a good model fit (Hu & Bentler, 1999). In addition, a CFI with values of .90 or higher reflects an acceptable fit (Bentler, 1990). Our measurement model had a good fit to the data, $\chi^2(294) = 482.551$, $p < .001$, RMSEA = .05, SRMR = .05, and CFI = .93. The factor loadings of the indicator variables ranged from 0.54 to 0.94, all *p*s < .001.

Next, we tested whether the assumption of time invariance of our measurement model would hold by comparing the measurement model in which factor loadings of the latent constructs were constrained to be equal over time with the measurement model in which factor loadings of the latent constructs were allowed to vary over time. Two indexes of time invariance, that is, the difference in CFI (ΔCFI < .01) and difference in chi-square statistic ($\Delta\chi^2$ = *ns*) were examined (Byrne & Stewart, 2006; Cheung & Rensvold, 2002). The fit of the constrained model did not significantly differ from the fit of the free model ($\Delta\chi^2(6) = 9.03$, *ns*) with the ΔCFI being lower than .01 (ΔCFI = .001), indicating time invariance of our measurement model.

Finally, we performed a multi-group CFA to examine the measurement equivalence across male and female participants by constraining the factor loadings of each latent construct to be equal, while

freeing intercepts and error variances. The fit of the constrained model did not significantly differ from the free model ($\Delta \chi^2(16) = 23.48$, *ns*), with the ΔCFI being lower than .01 (ΔCFI = .002). Hence, measurement equivalence can be assumed across both genders.

Structural models. In the first structural model, we examined the associations between the three identity styles at T1, adoption of the body perfect ideal at T2 and appearance-focused and health-focused eating regulation at T3. In doing so, we controlled for adoption of the body perfect ideal at T1 and for health-focused and appearance-focused eating regulation at T2, which allowed us to examine changes over time. Further, adjusted-BMI at T1, T2 and T3 and gender were entered as control variables. Fit indices indicated a good fit; χ^2 (403) = 658.211, $p < .001$, RMSEA= .05, SRMR = .08, CFI = .92. Gender and adjusted BMI had significant associations with several of the latent variables in the structural model. Male participants scored higher on the normative identity style ($\beta = -.15$, $p = .05$), whereas female participants scored higher on adoption of the body perfect ideal at T2 ($\beta = .12$, $p = .05$) and on appearance-focused eating regulation ($\beta = .13$, $p < .05$). Further, adjusted BMI had high stability over time ($\beta = .81$ and .84, $p < .001$) and changes in adjusted BMI were associated positively with changes in health-focused ($\beta = .43$, $p < .001$) and appearance-focused eating regulation ($\beta = .35$, $p < .001$).

Hypothesis 1A was not confirmed; the diffuse-avoidant style did not predict changes in body perfect adoption at T2 ($\beta = -.16$, *ns*). In line with Hypothesis 1B and 1C, an information-oriented style predicted significant decreases in body perfect adoption ($\beta = -.21$, $p < .01$), whereas a normative style predicted significant increases in body perfect adoption ($\beta = .26$, $p < .05$).

In line with Hypothesis 2, body perfect adoption at T2 predicted significant increases in appearance-focused ($\beta = .18$, $p < .05$) but not in health-focused eating regulation ($\beta = .04$, *ns*). Further, the indirect effects of the information-oriented and normative style on appearance-focused eating

via body perfect adoption were tested through a Sobel t-test. Both indirect effects were marginally significant; b = .05, p = .06, for the normative style and b = -.04, p = .07, for the information-oriented style.

Further, we tested for direct effects between the identity styles and changes in the eating regulation outcomes beyond body perfect adoption. One additional significant path emerged in which a diffuse-avoidant style at T1 predicted significant decreases in health-focused eating regulation at T3 (β = -.23, p < .01). This final model had a good fit to the data; χ^2 (399) = 676.328, p < .001, RMSEA = .05, SRMR = .08, and CFI = .93.

Finally, a multi-group comparison was tested to investigate potential structural differences between male and female participants. In line with Hypothesis 3, the constrained model, in which structural paths were set equal between boys and girls, did not result in a significant worse fit compared to the unconstrained model in which factor loadings were allowed to vary between male and female participants ($\Delta \chi^2(36) = 44.70$, *ns*; ΔCFI =0.004, < .01). Therefore, the final model, presented in Figure 1, can be considered invariant across gender.

Discussion

The present study investigated the role of adolescents' identity styles in adopting the body perfect ideal and eating regulation goals. Our results indicated that, depending on their identity style, some adolescents are more likely to increasingly adopt the body perfect ideal, at least in a Western society. This is problematic given that previous studies (Thompson & Stice, 2001) indicated that adoption of the body perfect ideal can result in unhealthy and disordered dieting behaviours over time.

We found that the normative style predicted increases in adoption of the body perfect ideal. This result confirms the pattern of findings of Duriez et al. (2012), where the normative style predicted an increased focus on extrinsic goals, such as image, financial success, and fame. Presumably, as normative-oriented individuals are highly sensitive to societal expectations

(Berzonsky, 1990), they easily buy into the body perfect ideal because it is highly prevalent and valued in Western society. Also, their strong preference for structure and cognitive closure (Duriez & Soenens, 2006; Soenens, et al., 2005) may lead these youngsters to adopt the societal expectations concerning attractiveness in a rather rigid and mindless fashion, at the expense of a flexible and critical reflection on what they perceive as beautiful or attractive themselves. As the present study also reveals, the body perfect ideal is associated with an increasing focus on attractiveness as the goal for regulating eating behaviours. Especially for normative-oriented adolescents, who typically demonstrate high levels of self-control (Berzonsky & Ferrari, 1996), this type of eating regulation may result in rigid and unhealthy dietary restrictions. Future research could explore this possibility more in-depth.

The current study also identified one of the identity styles as a protective factor against the adoption of the body perfect ideal. That is, information-oriented adolescents, who typically adopt an open and introspective stance, were found to increasingly distance themselves from the body perfect ideal. This finding is in line with previous studies demonstrating that teaching young girls to think more critically about the thin-ideal results in a lower adoption of the thin-ideal (Stice, Rohde, et al., 2011). It is also consistent with studies demonstrating that general self-determination, a psychological resource correlated positively with an information-oriented style (Soenens, et al., 2011), functions as a buffer against sociocultural pressures (Kopp & Zimmer-Gembeck, 2011; Mask & Blanchard, 2011; Pelletier & Dion, 2007). Apparently, adolescents who actively explore different life values and who weigh these against their own standards tend to question the body perfect ideal in current society. That is, they become more critical towards socially praised ideals of beauty. Possibly, these youngsters focus less on attaining extrinsic goals, such as physical attractiveness, but instead, pursue more intrinsic goals, such as close relationships, community contribution and physical health (e.g., Kasser

& Ryan, 1996). A number of recent studies indeed demonstrated significant associations between an information-oriented style and a relative preference for intrinsic goals (Berzonsky, et al., 2011; Duriez, et al., 2012). To the extent that information-oriented individuals do value the importance of physical appearance, they may develop a more personal stance towards physical attractiveness ,which is perhaps healthier and more realistic compared to the socially defined standards of attractiveness.

Based upon previous studies (Vartanian, 2009; Wheeler, et al., 2001; Wheeler, et al., 2003), we hypothesized that especially the diffuse-avoidant style would relate to increases in body perfect adoption. Although we found that this style was associated with body perfect adoption concurrently, it did not predict changes in adoption over time. A possible explanation for this unexpected finding might be that adolescents with a diffuse-avoidant style avoid committing to any long-term goal, including extrinsically oriented goals such as the body perfect ideal. Such an explanation is in line with Duriez et al. (2012) who found the diffuse-avoidant style to be related to the pursuit of extrinsic goals only at the cross-sectional level. These findings can perhaps be accounted for by the observation that diffuse-avoidant adolescents often let themselves be guided by acute situational demands, presumably because they are more impulsive (Berzonsky & Ferrari, 1996). As a result, they only may come to endorse a particular goal, such as the body perfect ideal, when facing the urgent necessity to make a particular identity choice. Experimental research, in which adolescents are forced to commit to a set of ideals, may examine these hypotheses in greater detail.

Another explanation for the lack of relationship between the diffuse-avoidant style and body perfect adoption over time can be found in the recent differentiation in the identity status literature between "carefree" and "diffused" diffusion individuals (Luyckx et al., 2008). The "carefree diffused" individuals do not explore any identities options at all and are not committed to any goal or value. Although youngsters in this status do not report low personal well-being (Luyckx, et al., 2008) they recently have

been found to display externalizing problems, including physical and relational aggression, drug abuse and the tendency to break societal norms and standards (Schwartz et al., 2011). Different from youngsters in the "carefree" diffusion status, those in the "diffused diffusion" status engage in some exploration, but they feel stuck in this process as they keep on ruminating about several identity issues. Youngsters in this status demonstrate low self-esteem and high depressive and anxiety symptoms (Luyckx et al., 2008). Therefore, especially the latter subgroup of diffused individuals may be at risk for adopting the body perfect ideal over time in an attempt to cope with their negative affect and feelings of incompetence that originates in their blocked exploration process. Given that the measurement of the diffuse-avoidant style does not allow us to differentiate between both "diffused" groups, we could not further investigate this hypothesis. Future research may want to examine this hypothesis.

Notably, some differences emerged between the correlational and longitudinal findings. First, the diffuse-avoidant style was associated positively with adoption of the body perfect within time, but did not predict changes in body perfect adoption over time. In contrast, the normative and information-oriented styles were not associated with body perfect adoption within time, but influenced relative increases and decreases in body perfect adoption over time. These findings emphasize the importance of longitudinal studies in deepening our knowledge on the role of identity processes in adoption of the body perfect ideal. Second, some differences also emerged before and after controlling for the variance shared between the identity styles. That is, at the correlational level (i.e., without controlling for shared variance) the associations between the normative and information-oriented style at T1 and body perfect adoption at T2 did not reach significance while they did reach significance in the structural model (where their shared variance was controlled for). These findings are consistent with other studies (Smits, Soenens, Vansteenkiste, Luyckx, & Goossens, 2010) in which the

predictive validity of the identity styles also has been found to increase once shared variance between the identity styles was controlled for [2].

Further, it was found that adoption of the body perfect related to increases in appearance-focused eating regulation over time. This finding is in line with previous studies demonstrating that adoption of the body perfect ideal in Western society is associated with dieting efforts and unhealthy weight-loss strategies (Thompson & Stice, 2001). Furthermore, the finding that appearance-focused, but not health-focused eating regulation is driven by adoption of the body perfect adoption, further emphasizes the qualitative distinction between both type of eating regulation goals. Indeed, previous studies indicated that appearance-focused eating regulation is grounded in body image concerns and is associated with negative outcomes such as bulimic symptoms. In contrast, health-focused eating regulation seems to be less detrimental as it is not necessarily driven by body image concerns and had no associations with disordered eating behaviours (Verstuyf, Patrick, et al., 2012; Verstuyf, Vansteenkiste, et al., 2012).

As for the relationship between the identity styles at T1 and changes in health-focused and appearance-focused eating regulation at T3, a trend emerged in which the normative and information-oriented styles were related indirectly to increases, respectively decreases, in appearance-focused eating regulation indirectly through adoption of the body perfect ideal. Although these indirect effects were only marginally significant, we would like to note that these effects were estimated quite conservatively. As such, the results are relatively consistent with the notion that body perfection adoption may play an intervening role in associations between identity styles and changes in appearance-focused eating regulation. Given that the current study was the first to examine these indirect associations, the model clearly is in need of replication. Further, we found a direct negative association between the

[2] In line with this reasoning, the prospective paths from the normative-oriented style and information-oriented style at T1 to adoption of the body perfect ideal at T2 were significant in a SEM-model equal to the SEM model presented in the results.

diffuse-avoidant style and health-focused eating regulation, suggesting that diffuse-avoidant individuals come to regulate their eating pattern gradually less on the basis of health and fitness goals. This finding is in line with previous studies showing that diffuse-avoidant individuals adopt a self-serving orientation, thereby endorsing hedonistic values that emphasize personal enjoyment and pleasure over long-term goals (Berzonsky, et al., 2011; Berzonsky & Ferrari, 1996; Luyckx, Lens, Smits, & Goossens, 2010). Indeed, regulating eating behaviours to improve or maintain health requires considerable effort and energy, especially in an environment that advertises food that is rich in sugar and fat (Baumeister & Heatherton, 1996). Therefore, diffuse-avoidant adolescents may turn away from eating healthily and, instead, indulge in easily enjoyable, yet highly sugared and caloric food.

Finally, no gender differences were found in the relationships between identity styles and adoption of the body perfect ideal. Given the paucity of studies on the potential moderating role of gender in the relationship between identity development and adoption of the body perfect ideal, more studies are needed before drawing more final conclusions. Further, the association between adoption of the body perfect ideal and eating regulation goals also appeared to be independent of one's gender. This might be partly due to the use of gender-adjusted measures. For instance, an adjusted version of body perfect adoption was used for male participants and dietary efforts were measured more broadly as "eating regulation" rather than "dieting". As a result, eating behaviours aimed at achieving the muscular ideals (e.g., eating more carbohydrates) also could be captured by this broader measure. In line with previous studies that made use of gender-adjusted measures (e.g., Vartanian, 2009), our study confirmed that the observed pattern of relations applied across gender.

Limitations

There were some methodological and conceptual limitations to our study. First, in terms of drop-out, only 60% of the initial sample participated

at T2 and T3. This was partly due to dropout from school or illness, but also because of administrative problems where codes could not be connected to the codes of the previous waves, for instance, because mistakes were made in generating the code (i.e., initials and birth date). Importantly, missing data analyses revealed data were missing at random, indicating no systematic loss of participants. Further, analyses using listwise deletion yielded quasi identical parameter estimates, which provides further confidence that the obtained results were not biased by the dropout rate. Second, some of our measures had relatively low reliabilities (i.e., the measures of the normative oriented identity styles and adoption of the body perfect ideal at T1). Third, given that the identity styles were measured only once, we could not investigate whether (changes in) adoption of the body perfect ideal and eating regulation goals in turn related to changes in identity styles. As a consequence, bidirectional associations between the study variables could not be examined. It would be interesting for future research to examine, for instance, whether adoption of the body perfect ideals not only follows from a normative style but also further strengthens the use of a normative style. In the process of adopting the body perfect ideals people may become even more sensitive to social and societal expectations than they already were, thereby increasingly engaging in a normative approach to their identity development. Fourth, although we purposely opted for a fairly broad (and, hence, gender-adjusted) measure of eating regulation, we did not capture more specific behaviours such as fasting, binge eating, sporting, using laxatives, or doping. Doing so would have allowed us to investigate whether and how appearance-focused and health-focused eating regulation relates to these behaviours and whether gender differences would have been found in these associations.

Finally, the present study was limited to the identity process model. However, identity has many aspects and people usually have multiple views on themselves (Suh, 2002). For instance, rather than focusing on one's personal identity processes, some researchers have examined people's

collective identity and, more specifically, their ethnic identity (e.g., Phinney, 1990), which also has been shown to relate to adoption of the body perfect ideals (Wildes, Emery, & Simons, 2001). For instance, research has found that African-American women are less likely to adopt the thin-ideal and to display body image concerns and disordered eating behaviours compared to their White counterparts (Wildes, et al., 2001). However, African-American women who enter predominantly White colleges seem to be at increased risk for adopting the Western White ideals of beauty, especially if they have a weak racial identity (Wildes, et al., 2001). In future studies, a wider range of concepts related to identity could be included, such that interactions between the identity styles and one's ethnic identity could be investigated. For instance, African-American women with a normative identity style might be less vulnerable to adopt the Western views on beauty once they enter predominantly White schools, as they tend to make strong commitments early in life and are less open to changes in these commitments. In contrast, African-American women with a diffuse-avoidant style might more easily switch to the "new" norms in their environment and, therefore, be more at risk of adopting the White standards of beauty.

Clinical Implications

Despite these limitations, we believe our study revealed some interesting findings that are also of clinical relevance. First, the current results suggest that adolescents may be guided towards a coherent and personal defined sense of identity. Adolescents can be stimulated to reflect about the goals and values that are important to them and about their personal life direction. Indeed, such "inner compass" might guide youngsters to pursue their own goals and values in life rather than to follow expectations mindlessly and to comply with societal pressures (Assor, 2012). In line with this, experimental research has revealed that adolescents often mention intrinsic goals, such as building close relationships with friends and family, when they are invited to think about personally important

goals (Crocker, Niiya, & Mischkowski, 2008). Furthermore, these interventions were found to stimulate prosocial feelings and behaviours (Crocker, et al., 2008; Thomaes, Bushman, de Castro, & Reijntjes, 2012). Also, brief interventions in which more intrinsic values, such as social connectedness, health and contributing to the society, are emphasized resulted in better grades, health and wellbeing (Vansteenkiste, Lens, & Deci, 2006; Walton & Cohen, 2011). Possibly, these very same brief interventions focusing on life goals and values may reduce youngsters' risk of adopting the body perfect ideal.

In a more general sense, it seems important to create an environment in which adolescents feel free and supported to explore alternative identities. Research in college students has found that psychologically controlling parenting, in which parents use guilt and shaming to manipulate their children, predicts greater difficulties in making commitments and identifying with those commitments (Luyckx, Soenens, Vansteenkiste, Goossens, & Berzonsky, 2007). Therefore, rather than pressuring adolescents to make choices as quickly as possible to establish a sense of identity, it seems important to stimulate them to reflect about their goals, values and future direction in life. This would guide them towards a more stable and coherent, but also self-defined, sense of identity (Assor, 2012; Soenens & Vansteenkiste, 2011).

Finally, in line with previous studies, our results suggest that adolescents can better be challenged to think critically about the current body perfect ideal (e.g., Stice et al., 2011). They could be helped in defining physical attractiveness in a more healthy and attainable manner compared to the extreme thin or muscular ideal to which they are exposed. Such interventions could lower their adoption of the body perfect ideals and, in turn, result in less appearance-focused eating behaviours.

Conclusion

The results of our study indicated that dynamics of personal identity development and, more specifically, adolescents' style of identity exploration is longitudinally related to the adoption of the body perfect ideal that, in turn, relates to increased appearance-focused eating regulation. Young adolescents who have the tendency to stick more rigidly to expectations and norms in their environment seem to be more at risk for developing a more problematic attitude towards beauty and eating. In contrast, young adolescents who actively seek out information and who have a critical and open stance towards information in their environment gradually distance themselves from the more extreme body perfect ideal and, therefore, are less likely to display eating behaviours aimed at attaining this ideal over time. The social environment may stimulate adolescents to reflect actively on their life goals and values such that they end up building a well-anchored internal compass, which serves as a resource against the exposure to the body perfect ideal. Possibly, such identity-grounded interventions could add to the effectiveness of intervention programs aimed at lowering the onset of disordered eating behaviours.

Table 1

Correlations, means and standard deviations between the study variables

		1.	2.	3.	4.	5.	6.	7.	8.	10.	11.	Boys	Girls
T1	1. Age	1										13.59	13.58
	2. Adjusted BMI	.08	1									100.15	99.87
	3. Information-oriented Style	-.14*	-.06	1								3.84	3.91
	4. Normative Style	-.12*	-.06	.19***	1							2.93	2.81
	5. Diffuse-Avoidant Style	-.05	.03	-.10*	-.30***	1						2.87	2.67
	6. Adoption Body Perfect	.10*	.07	-.00	.10*	.20**	1					2.93	2.82
T2	7. Adoption Body Perfect	-.01	-.06	-.10	.10	.09	.39***	1				1.90	2.21
	8. Health-focused ER	.03	.01	.14*	.02	-.00	.15*	.14**	1			5.33	5.26
	9. Appearance-focused ER	.11	.30***	.01	.07	.11	.30***	.34***	.50***	1		4.06	4.24
T3	10. Health-focused ER	-.11	.10	.18**	.07	-.13*	.04	.11	.40***	.20**	1	5.11	5.29
	11. Appearance-focused ER	.01	.30***	.06	.01	.01	.30***	.29***	.28**	.51***	.52***	4.04	4.47

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. T1 = Time 1, T2 = time 2, T3 = Time 3, ER = eating regulation.

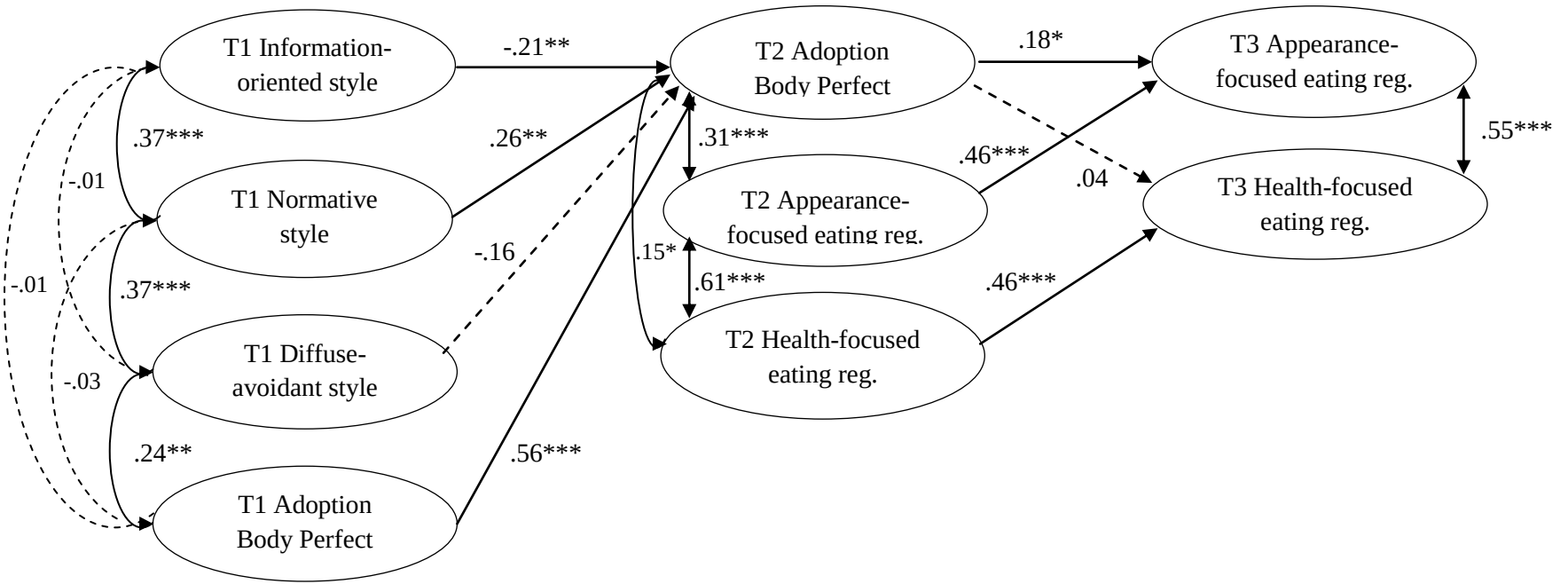

Figure 1. Structural relations between the identity styles at Time 1, adoption of the body perfect ideal at Time 2, and eating regulation goals at Time 3. Solid lines represent significant paths, whereas dotted lines represent non-significant paths. * $p < .05$, ** $p < .01$, *** $p < .001$.

Chapter 8

General Discussion

The present dissertation examined the role of motivation underlying eating regulation in relation to a variety of eating outcomes, that is, disordered eating symptoms, healthy eating behaviours, weight loss, and exhaustion. This final chapter starts by providing a summary of the key findings of the dissertation in light of the five aims identified in the General Introduction. Then, in Part II, broader theoretical reflections are provided together with a set of recommendation for future research. In Part III, a set of limitations of the current dissertation is formulated. Finally, based on the conducted empirical work in this dissertation but also on the broader Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000) literature, clinical implications are discussed in Part IV.

Part I. Overview of Key Findings in Light of Aspired Aims

People can regulate their eating habits in a variety of ways. One of the most common and, at the same time controversial, types of eating regulation is dietary restraint, which can be defined as the intention to restrict food intake (van Strien, 1999). Dietary restraint is widely spread among normal-weight and overweight women in Western society (e.g., Field, Haines, Rosner, & Willett, 2010). The strong prevalence of dietary restraint can be grounded in sociocultural factors, such as the importance and meaning attached to size as well as the increase in body image concerns and the epidemiology of overweight and obesity in Western society (Fussenegger, Pietrobelli, & Widhalm, 2008; Ogden, Yanovski, Carroll, & Flegal, 2007; Ogden, 2010). In spite of its high prevalence, dietary restraint is not as effective or harmless as most dieters may believe (Mann et al., 2007; Stice, Presnell, & Spangler, 2002). That is, abundant research regarding the consequences of dieting behaviours revealed that dietary restraint can, over time, result in disordered eating symptoms (Liechty & Lee, 2013; Stice, Davis, Miller, & Marti, 2008). Further, studies in the field of overweight and weight loss found that dieting interventions among overweight and obese persons at best result in short-term weight-loss, but, for the majority of them, lost weight is regained over time (Mann, et al., 2007; Wing & Hill, 2001; Wooley & Garner, 1991). Although on average dietary restraint does not produce the hoped for benefits, it is also true that some persons are successful at losing weight (Kraschnewski et al., 2010; van Strien, 1999; Wing & Hill, 2001) and at decreasing binge eating symptoms (Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998; Stice, Presnell, Groesz, & Shaw, 2005). In light of these inconsistent results, researchers have called upon the necessity to develop more integrative frameworks, in which mechanisms are proposed and examined that help explain both adaptive and adverse consequences of dietary restraint (e.g., Stroebe, van Koningsbruggen, Papies, & Aarts, 2013).

Aim 1: Providing a Comprehensive Motivational Model on Eating Behaviours

In line with the call for developing more comprehensive theoretical frameworks on eating behaviours (Ogden, 2010; Stroebe, et al., 2013), in Chapter 2 SDT was proposed as a theory offering such a more encompassing perspective on eating behaviours (Deci & Ryan, 2000; Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). The basic premise within SDT is that the basic psychological needs for autonomy, competence, and relatedness are implied in people's flourishing and well-being as well as in the etiology of psychopathology, both in general and with respect to specific life domains (Vansteenkiste & Ryan, 2013). Thus, the same principle, that is, the psychological needs would allow researchers to build bridges between pathology-oriented and growth-oriented literatures in general and between the literature on body image and disordered eating and weight loss and healthy eating in particular.

Specifically, when the psychological needs are supported, humans' inherent tendency towards growth and integration would be catalyzed, thereby engendering a healthier lifestyle and a more adaptive motivational profile for regulating ongoing eating behaviours. In contrast, when needs are (chronically) blocked or thwarted, people tend to seek derivative means to get their needs met, thereby either pursuing need substitutes (e.g., wanting to look attractive to receive contingent appreciation) or engaging in compensatory behaviors (e.g., sticking to rigid dieting behaviours or engaging in binge eating behaviours). As will be discussed in greater detail below, the last two chapters dealt with this part of the proposed framework, as they focused on the relation between general need frustration and binge eating symptoms (Chapter 6) and the role of identity styles in the prediction of the body perfect ideal and of the type of goals underlying eating regulation (Chapter 7).

Apart from being implicated in the etiology of disordered eating, need satisfaction and frustration are also involved in the motivational

dynamics of individuals' eating regulation efforts. That is, whereas need satisfaction may both follow from and contribute to a more adaptive motivational functioning, need frustration would both follow from and contribute to a more maladaptive motivational functioning. Indeed, individuals' motivational profile for eating regulation may be quite different, with some persons fully endorsing the decision to engage in eating regulation (i.e., autonomous regulation) and focusing on their health (i.e., intrinsic goals) and other persons feeling pressured to regulate their eating behaviours (i.e., controlled regulation) and wanting to increase their attractiveness and physical appeal (i.e., extrinsic goals).

Autonomous motives and health goals are considered more adaptive types of motivation to regulate eating behaviours, because they would engender more diet-specific need satisfaction. In contrast, controlled motives and appearance goals would be less adaptive or even maladaptive types of motivation because they would evoke need frustrating experiences. For this reason, in the overview, it was hypothesized that autonomous and health-focused eating regulation would relate to healthy eating behaviours, whereas controlled and appearance-focused eating regulation would be related to disordered eating symptoms. These proposed hypotheses were examined in Chapters 3, 4 and 5 in the dissertation.

Aim 2: Gaining Insight in the Relations between the "What" and "Why" of Eating Regulation and Eating Outcomes

In light of the proposed encompassing model in Chapter 2, an important aim of the present dissertation was to investigate relationships between goals ("What") and motives ("Why") underlying eating regulation and eating outcomes. Two chapters addressed the role of the goals underlying eating regulation. In Chapter 3, appearance-focused eating regulation was found to be associated positively with binge eating symptoms in a sample of female adolescents, whereas no association emerged for health-focused eating regulation. Chapter 5 extended Chapter 3 by adopting

a diary design. Apart from replicating the positive association between appearance-focused eating regulation and binge eating symptoms among both adolescent and adult self-declared dieters, it was shown that health-focused eating regulation related positively to healthy eating behaviours and negatively to binge eating symptoms. These findings are in line with previous studies, which indicated that investment in appearance goals was related to drastic dieting behaviors and binge eating symptoms, whereas investment in health did not relate to these maladaptive outcomes (e.g., Putterman & Linden, 2004). These findings are also in line with the hypothesis that the pursuit of intrinsic goals relates to well-being and adaptive outcomes in specific domains, whereas the pursuit of extrinsic goals relates to more dysfunctional outcomes (Deci & Ryan, 2000).

Not only the "What" but also the "Why" of eating regulation was found to relate to eating outcomes. Two chapters addressed the role of motives underlying eating regulation. In Chapter 5, in a sample of adolescent and adult self-declared dieters, autonomous motives underlying eating regulation related positively to healthy eating behaviours, whereas controlled motives underlying eating regulation related positively to excessive concerns over eating and weight. Whereas the associations obtained in Chapter 5 were concurrent in nature, Chapter 4 showed that the motives underlying eating regulation efforts in clients participating in a Weight Watchers program also predicted changes in eating outcomes over time. Specifically, autonomous motives underlying eating regulation were related to increases in adaptive eating behaviours, whereas controlled motives underlying eating regulation were associated with increases in dysfunctional outcomes. Moreover, in this study, rather than considering the effects of the composite scores of autonomous and controlled regulation, the effects of four separate regulatory styles (i.e., external, introjected, identified, and intrinsic) were examined in greater detail. This was considered important because many self-declared dieters regulate their eating patterns to avoid feelings of shame and guilt, while their self-worth is very much attached to their successes, such that it

was worthwhile to examine the unique contribution of introjected (but also the other types) of regulation. A set of interesting findings emerged. That is, intrinsic motivation predicted increases in healthy eating behaviours and decreases in excessive concerns over eating and weight, whereas identified motivation predicted decreases in binge eating symptoms. In contrast, introjected and external motivation related to increases in excessive concerns over eating and weight and, in addition, external motivation predicted increases in binge eating symptoms. Importantly, in Chapter 4, the motives underlying eating regulation were also related differentially to weight changes, with intrinsic motivation relating to decreases in weight and introjected motivation relating to increases in weight. Finally, intrinsic and identified motives for eating regulation were related to decreasing feelings of dietary exhaustion, whereas introjected motives were related to increases in such feelings.

These findings are in line with previous studies, which found positive associations between autonomous motives for eating regulation and healthy eating behaviours and between controlled motives for eating regulation and disordered eating symptoms (Otis & Pelletier, 2008; Pelletier & Dion, 2007; Pelletier, Dion, Slovenic-D'Angelo, & Reid, 2004). The current studies extended these findings by demonstrating that these relationships also occur in groups of self-declared dieters of varying age and weight-status as well as by demonstrating associations with changes in these eating behaviours and weight over time.

Finally, in Chapter 5, an additional aim was to investigate whether the goals underlying eating regulation ("What") yielded a unique association with eating behaviours after controlling for the motives underlying eating regulation ("Why"). This was deemed important because some researchers questioned the distinction between goals and motives, stating that the intrinsic-extrinsic goals distinction is "old wine in new bottles" (Carver & Baird, 1998; Srivastava, Locke, & Bartol, 2001). Said differently, the intrinsic-extrinsic goal-content distinction would be completely overlapping

with the autonomous-controlled motives distinction, implicating that there is no need for introducing the goal-content distinction. In line with the hypothesis that goals and motives represent two separate facets of motivation, appearance goals and controlled motives were found to be modestly correlated and to yield unique associations with dysfunctional outcomes. Along similar lines, health goals and autonomous motives were modestly correlated and yielded unique associations with adaptive outcomes. These findings are in line with Sheldon, Ryan, Deci and Kasser (2004), who reported in a series of four studies that intrinsic, relative to extrinsic, goal striving related uniquely to general well-being beyond the autonomous and controlled motives underlying goal striving. Implications of the distinction between the "What" and "Why" of behavior and the need for more research are discussed in greater detail below.

Aim 3: Examining the Processes of Need Satisfaction and Need Frustration

A third aim of the present dissertation was to investigate the separate role of psychological need satisfaction and need frustration vis-à-vis eating regulation, given that a lack of psychological need satisfaction does not necessarily imply the active frustration of these needs. Across different studies in this dissertation, diet-specific need frustration appeared a robust correlate of adverse eating outcomes including binge eating symptoms (Chapters 3 through 5), excessive concerns over eating and weight (Chapters 4 and 5) and exhaustion (Chapter 4), whereas diet-specific need satisfaction was associated with healthy eating behaviours, weight loss, and decreases in exhaustion (Chapter 4). Different from the other chapters, in Chapter 6, need satisfaction and frustration were examined at the general rather than domain-specific (i.e., with respect to eating regulation) level. Moreover, a within-person design was employed to examine within-person relations between general need satisfaction and frustration and binge eating symptoms on a day-to-day basis. In line with the hypothesis forwarded in the conceptual

chapter (Chapter 2) that general need frustration can elicit compensatory behaviours, such as binge eating symptoms, within-person fluctuation in psychological need frustration related to within-person fluctuation in binge eating symptoms, with the frustration of all three needs yielding a unique contribution. In contrast, day-to-day variation in general need satisfaction was unrelated to day-to-day variation in binge eating symptoms.

In general, these findings indicate that need satisfaction relates to the "bright" side of eating regulation, that is, the engagement in a healthier lifestyle, whereas need frustration is involved in the "dark side" of eating regulation, that is, the occurrence of disordered eating symptoms. As such, these findings are in line with the hypothesis that especially need frustrating experiences are relevant to the prediction of ill-being and psychopathology (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Vansteenkiste & Ryan, 2013).

Apart from examining the predictive validity of psychological need satisfaction and need frustration in the prediction of eating outcomes, the explanatory role of both constructs in the relation between the "What" and "Why" of eating regulation and eating outcomes was also examined. Findings regarding this hypothesized mediating role were not entirely consistent across the different chapters in this dissertation (Chapters 3 through 5). In Chapter 3, evidence was obtained for the explanatory role of diet-specific need frustration in the relation between appearance-focused eating regulation and binge eating symptoms, with need frustration fully accounting for the observed association. In Chapter 5, the mediating role of diet-specific need frustration in the relation between appearance-focused eating regulation and binge eating symptoms was confirmed in a sample of adolescent and adult self-declared dieters and, moreover, could be extended to the relation between controlled motivation and binge eating symptoms as well. Further, diet-specific need frustration appeared to be a partial mediator in the relation between appearance-focused and controlled eating regulation and excessive concerns over eating and weight. Also, the negative relation

between autonomous motives underlying eating regulation and binge eating symptoms and excessive concerns over eating and weight could be partially accounted for by diet-specific need frustration.

Different from Chapters 3 and 5, in Chapter 4, both diet-specific need satisfaction and need frustration were simultaneously included as potential mediating variables and a longitudinal design was adopted. No evidence was obtained for the mediating role of diet-specific need frustration. That is, although changes in diet-specific need frustration related to changes in disordered eating symptoms, controlled motives for eating regulation did not predict changes in diet-specific need frustration, thereby excluding the possibility to examine the mediating role of need frustration. Yet, autonomous motives for eating regulation did predict increases in diet-specific need satisfaction which, in turn, predicted increases in healthy eating behaviours and weight loss and decreases in exhaustion. It is important to note that, in the final model, only the indirect path from intrinsic motivation to decreases in exhaustion through diet-specific need satisfaction reached significance.

To sum up, in Chapters 3 and 5, evidence was obtained for the mediating role of diet-specific need frustration in concurrent associations between goals and motives underlying eating regulation and eating outcomes. In Chapter 4, however, diet-specific need satisfaction and frustration did not mediate or mediated only partially the longitudinal associations between motives underlying eating regulation and eating outcomes over time. Future studies, in which diet-specific need satisfaction and frustration are systematically included as mediating variables, are needed to further examine their distinct mediating role, an issue that is further elaborated upon below.

Aim 4: Examining the Role of Weight Status and Age

A fourth aim of the present dissertation involved investigating the role of motivational dynamics among self-declared dieters as a function of

weight status and age. To achieve this aim, we first compared the motivational profile of self-declared dieters differing in weight status and age at the descriptive level. Second, we examined the predictive validity of the proposed motivational model at the structural level.

As for the descriptive differences, in Chapter 5, evidence was obtained that late-adolescent, compared to adult, self-declared dieters report more controlled and appearance-focused eating regulation and less autonomous and health-focused eating regulation. This finding is in line with studies within the domain of body image concerns, which indicate that younger girls are more vulnerable to experience sociocultural pressures to be thin compared to older women (e.g., Groesz, Levine, & Murnen, 2002). More generally, these findings are in line with evidence showing that, as people grow older, their motives and goals increasingly reflect integrative and growth-oriented functioning (Sheldon, Houser-Marko, & Kasser, 2006). Further, overweight, compared to normal-weight, self-declared dieters scored lower on health-focused and autonomous eating regulation and higher on controlled motivation. In Chapter 4, the differences in motivational profile according to weight status were explored further. Normal-weight dieters scored highest on identified regulation, while obese dieters scored lowest, and overweight dieters fell in between both groups. In contrast, external regulation was lower in normal-weight dieters compared to both overweight and obese dieters. Together then, overweight persons seem to have a less beneficial motivational profile as they experience more external pressures to regulate their eating behaviours and, at the same time, identify less with the self-importance of regulation their eating pattern, while also aspiring less health-related goals.

Although the motivational profile of self-declared dieters differed according to weight status and age, no evidence was obtained for structural differences between normal-weight, compared to overweight, and between adolescent, compared to adult, self-declared dieters in the relationship between the “What” and “Why” of eating regulation and eating outcomes. In

other words, appearance goals and controlled motives were found to relate to adverse eating outcomes and health goals and autonomous motives were found to relate to adaptive eating outcomes, regardless of self-declared dieters' age or weight. These results are in line with SDT, which claims that controlling motives and extrinsic goals may yield a cost for everyone, presumably due to the interference with the satisfaction of the basic psychological needs for autonomy, competence, and relatedness, which are considered universal vitamins for people's functioning (Chen, Vansteenkiste, Beyers, Soenens, & Van Petegem, 2013; Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013).

Together then, the present set of findings indicate that younger and overweight self-declared dieters display a less adaptive motivational profile for eating regulation. In spite of these mean-level differences, the observed correlates of the "What" and "Why" of eating regulation were found to be invariant across weight status and age.

Aim 5: Investigating Antecedents of Appearance-Focused Eating Regulation: Body Dissatisfaction and Identity Styles

In the conceptual framework proposed in Chapter 2, it was hypothesized that a dysfunctional motivational profile for eating regulation might be rooted in the pursuit of need substitutes. A fifth aim of the present dissertation, then, was to examine whether appearance-focused eating regulation might be grounded in body dissatisfaction and adoption of the body perfect ideals.

In Chapter 3, associations between body dissatisfaction and goals underlying eating regulation were investigated. Evidence was obtained that body dissatisfaction is related positively to appearance-focused eating regulation, but not to health-focused eating regulation. Further, in Chapter 7, we found that adolescents who increasingly adopt the body perfect ideal (i.e., the thin-ideal for girls and the muscular ideal for boys) increasingly reported being appearance-focused during their eating regulation. In that

chapter we also explored the more distal developmental origins of adoption of the body perfect ideals by examining whether adolescents' style of exploring identity-related issues related to changes in adoption of the body perfect ideal over time. Adolescents with a normative identity style were found to increasingly adopt the body perfect ideal, whereas adolescents with an information-oriented approach seemed to increasingly reject the body perfect ideal. A diffuse-avoidant identity style was unrelated to changes in adoption of the body perfect ideals, but related directly to decreases in health-focused eating regulation. These results were similar for boys and girls.

Thus, body dissatisfaction and adoption of the body perfect ideal is related to appearance-focused, but not health-focused, eating regulation. Overall, the way how adolescents deal with identity-related challenges, a crucial task during adolescence (Erikson, 1968), relates differentially to changes in adoption of the body perfect ideals. Therefore, these identity styles may present potential risk and protective factors for engaging in appearance-focused eating regulation.

Part II. Theoretical Reflections

With this basic set of findings in mind, a number of theoretical reflections are provided to connect the findings to the broader literature on dietary restraint, body image concerns, and motivation. Specifically, the following issues are reconsidered: (1) Is eating regulation harmful or adaptive? (2) Do the goals ("What") underlying eating regulation deserve any attention beyond the motives ("Why")? (3) Is the distinction between psychological need satisfaction and need frustration useful? (4) Can the proposed motivational dynamics be generalized across age and weight status?

Is Eating Regulation Harmful or Adaptive?

The broader aim of the current dissertation was to investigate whether eating regulation oriented towards different goal-contents and being undergirded by different motives would be differentially related to eating outcomes. Overall, the answer seems positive, as health-focused eating regulation and autonomous motives yielded more desirable and less undesirable eating outcomes, while the opposite pattern was observed for appearance-focused eating regulation and controlled motivation. The broader conclusion then is that the type of goals and type of motives underlying eating regulation matters. What do these findings imply for the more traditional research lines on dietary restraint?

Dietary restraint and motivation. The relationship between dietary restraint and binge eating symptoms has been frequently investigated from the perspective of Dietary Restraint Theory (Herman & Polivy, 1980; Polivy & Herman, 1985). The central claim within this theory is that the cognitive control over food intake (i.e., dietary restraint) will result in episodes of both undereating as well as uncontrollable eating, that is, binge eating symptoms (Polivy & Herman, 1985). Results on the relation between dietary restraint and binge eating symptoms, however, revealed inconsistent findings, which could in part be attributed to methodological factors (Stice, Sysko, Roberto, & Allison, 2010; van Strien, 1999, 2008), including different questionnaires used to measure dietary restraint. Based on the results of the present dissertation, inconsistent results obtained in previous studies might also be explained by the different motivational orientations of self-declared dieters. That is, although dietary restraint (and eating regulation more generally) might not be harmful or adaptive in itself, the motivational dynamics underlying dieting efforts and eating regulation might be. Indeed, especially appearance-focused and controlled eating regulation relate to binge eating symptoms, whereas health-focused and autonomous eating regulation yield desirable outcomes, such as healthy eating behaviours and fewer binge eating symptoms.

Some of the cognitive mechanisms linking dietary restraint to binge eating symptoms, as described in the Dietary Restraint Theory, may characterize the functioning of controlled and appearance-focused dieters. For instance, when exposed to triggers such as eating a small amount of high-caloric foods or emotional distress, dieters might give in to their urge to eat, known as the "What"-the-Hell-Effect" (Polivy & Herman, 1985). This mechanism might be most likely to occur among self-declared dieters who feel exhausted by their dieting efforts due to the underlying controlled motives or the appearance-focused orientation. Future research could examine this possibility. Another cognitive mechanism described in Dietary Restraint Theory, is the active rebellion or defiance against imposed cognitive dietary rules (Ogden, 2010). Although not examined in relation to eating behaviours, research within SDT has linked oppositional defiance to controlled forms of motivation in other life domains (Van Petegem, Vansteenkiste, & Beyers, 2013). Future research could include a more direct measure of defiance against eating-related advice and guidelines to examine whether a controlled regulation goes hand in hand with such defiance.

Weight change and motivation. Dieting behaviours have also received a lot of attention in the domain of overweight and obesity (Mann, et al., 2007). Within this research domain, the effectiveness of dieting interventions is often evaluated primarily in terms of the amount of (sustained) weight-loss. The question posed by several researchers in this field is whether offering dieting interventions to overweight persons will be conducive to weight loss or whether dieting should be discouraged (e.g., Mann, et al., 2007). Based on the results of the present dissertation, one could argue that the question is not so much whether overweight persons should diet or not diet, but why they diet and what they want to achieve through their dieting. Indeed, overweight persons who reported more pressuring motives to regulate their eating behaviours did not report improvements over time. On the contrary, maladaptive eating outcomes (including weight gain) were more likely to emerge when overweight

persons scored high on controlled motivation (see Chapter 4). Overall then, motivational dynamics need to be attended to in current dieting frameworks as well as in interventions on dieting among overweight and obese individuals. This claim is in line with recent reviews which indicate that autonomous motivation for weight-loss treatment is an important predictor of sustained weight-loss (Teixeira, Going, Sardinha, & Lohman, 2005).

Further, although weight-loss is often considered the utmost important criterion for determining the success of a dieting intervention, we may want to move beyond this criterion. This is because eating regulation and its underlying dynamics has implications for a broader set of eating outcomes. For instance, although dieting interventions might not result in sustained weight-loss, they might be effective in terms of increasing a healthier lifestyle. Alternatively, although dieting interventions may be successful in terms of weight-loss, the dieting itself may be so exhausting that individuals pay an emotional price for their eating regulation efforts or become vulnerable to disordered eating symptoms, such as excessive concerns over eating and weight and binge eating symptoms. Interestingly then, the motivational basis of individuals' eating regulation efforts in the present dissertation was found to matter for these additional outcomes as well. Specifically, autonomous and health-focused eating regulation were associated with healthy eating behaviours (Chapter 4 and 5), less binge eating symptoms and excessive concerns over eating and weight (Chapter 4) and less exhaustion (Chapter 5), whereas controlled and appearance-focused eating regulation were related to more binge eating symptoms (Chapters 3 through 5), excessive concerns over eating (Chapters 4, 5) and more exhaustion (Chapter 4).

Future research may examine whether the benefits associated with autonomous and health-focused eating regulation extend beyond the outcomes studied in the present dissertation. As the engagement in eating regulation efforts of people scoring high on autonomous motives and health-focused goals depends less upon the receipt of contingent acceptance, praise,

and rewards, their eating regulation may entail a more spontaneous generalization of eating regulation to other, non-recommended, healthy behaviours. Consistent with this hypothesis, Mata and colleagues (2009) provided evidence for the so-called "spill-over" effect of their motivational intervention. Increasing autonomous motivation for exercise improved eating behaviors over a 12-month period although eating was not the central focus of their motivational intervention. This finding suggests that to the extent that individuals develop a more autonomous and health-focused regulation for eating regulation, they may develop a more encompassing healthy lifestyle as a whole, thereby engaging in more physical activity and less smoking. Also, it would be interesting to examine whether the effects of the "What" and "Why" of eating regulation would generalize to individuals' functioning in other life domains and individuals' general well-being. To the extent that controlled motives and appearance-focused goals dominate one's functioning, individuals may be more heavily preoccupied with their eating regulation, which may take energy and attention away from other activities in life. Overall then, it is suggested that a motivational component needs to be included in traditional dieting interventions as a means to stimulate optimal motivation and to better guarantee people's shift towards a more encompassing and lasting healthy lifestyle.

Further reflections on dieting and eating regulation. It is important to note that in this dissertation eating regulation rather than dietary restraint or dieting was measured. That is, dietary restraint entails the cognitive intention to restrict food intake to lose or maintain weight, which may or may not result in undereating (van Strien, 1999). In contrast, dieting reflects the actual reduction of food intake (Lowe, Whitlow, & Bellwoar, 1991). Eating regulation, as measured in the current dissertation, is a broader concept: it entails exerting cognitive control over food intake, but it does not necessarily mean that individuals try to restrict their food intake. For instance, some individuals might try to eat differently (e.g., eat more fruits and vegetables) rather than trying to cut down the amount of food they eat.

Although we found no evidence for an independent contribution of intensity of eating regulation in the prediction of need frustration and bulimic symptoms above and beyond the goals underlying eating regulation in Chapter 3, this null-relation may also be due to the measure used. That is, if we would have assessed restriction of food intake in particular, perhaps a unique association with disordered eating outcomes would have emerged.

Future research may want to include both traditional measures of dieting and dietary restraint, such as the Dutch Eating Behaviour Questionnaire (van Strien, Frijters, Bergers, & Defares, 1986), and the measures of eating regulation used in this dissertation to examine their relation and their associations with underlying motives. Indeed, previous work suggests that autonomous and controlled motives may yield a different relation with both. Pelletier et al. (2004) and Otis and Pelletier (2008) showed that controlled motives were associated with a more restraining or avoidance approach towards food intake, whereas autonomous motives were related to eating differently without necessarily wanting to restrict food intake. Similar relations may emerge for appearance-focused and health-focused eating regulation.

One of the reasons why autonomous regulation perhaps entails greater benefits is because individuals scoring high on autonomous motivation are more open to alternative approaches to their eating habits. That is, when one is focused on avoiding too much food intake (which is more likely to be the case when being controlled regulated), it is not clear what self-declared dieters can do; it is mainly clear what they are not allowed to do. Yet, when being focused on adopting a different eating pattern (which is more likely to occur when people have autonomous motives), people can move towards a desired end goal and, hence, can more easily experience a sense of success in doing so. Consistent with this expectation, past work in the achievement motivation tradition has shown that approach versus avoidance regulation of personal strivings yields greater

well-being by affording a greater probability of success (Elliot & Sheldon, 1998).

Deserves the "What" of Eating Regulation any Attention beyond the "Why"?

Moving beyond the intrinsic-extrinsic motivation distinction. Historically, SDT has dealt with the question whether the participation in an activity for intrinsic or extrinsic motives yields a difference for persistence and task quality (Deci, 1972). That is, does it make a difference whether the activity is experienced as interesting, enjoyable, and inherently appealing (i.e., intrinsically motivated) or whether the activity serves an end (i.e., extrinsically motivated). Yet, as also shown in Chapter 4, in the present dissertation, many self-declared dieters do not necessarily find that regulating their eating behaviours is enjoyable and inherently satisfying. However, an absence of intrinsic motivation does not necessarily signal low-quality motivation. If self-declared dieters fully endorse the benefits associated with their eating regulation (i.e., identified regulation), their behavior is instrumental (i.e., extrinsic) in nature, yet still represents an autonomous mode of functioning, much like is the case for intrinsic motivation. Indeed, SDT has moved beyond the extrinsic-intrinsic motivation distinction and proposed that the degree of autonomy is more important compared to the degree to which motivation is driven intrinsically or extrinsically (Deci & Ryan, 2000).

In Chapter 4, both identified and intrinsic regulation yielded unique longitudinal benefits in a sample of self-declared dieters attending a Weight Watchers program, although intrinsic motivation in particular yielded positive changes in a broad range of eating outcomes. The broad positive effects for intrinsic motivation are interesting and remarkable, as intrinsic motivation was found to have less predictive validity, compared to identified regulation, in domains where intrinsic motivation is also less prevalent, including politics (Losier & Koestner, 1999) and academics (Burton, Lydon,

D'Alessandro, & Koestner, 2006). Although more work is needed in this respect, these results are promising because intrinsic motivation can be enhanced by means of relatively straightforward interventions. For instance, intrinsic motivation can be promoted by encouraging dieters to try out and experiment with different foods types and meals and cook with others, such that cooking becomes a pleasant activity.

The longitudinal benefits of both types of autonomous regulation stand in contrast with the adverse correlates of controlled regulation, which could either reside in external or internal pressures. Interestingly, pressures which origin from inside were also found to have negative effects on eating outcomes. Although some studies have indicated it is important to increase "internal" motivation for eating regulation (Elfhag & Rossner, 2005; Miller & Rollnick, 2002), research findings within this dissertation suggest that especially autonomous motives for eating regulation should be increased, rather than any type of internal motivation. The distinct correlates of different forms of extrinsic motivation (i.e., external and introjected versus identified regulation) obtained in Chapter 4 underscore the usefulness to move away from the intrinsic-extrinsic motivation distinction to the autonomous-controlled distinction. These findings are fully consistent with the large number of studies that have demonstrated the importance of autonomous, relative to controlled, motivation (for an overview see Vansteenkiste, et al., 2010).

Another intrinsic-extrinsic distinction, yet, at the goal-level. In the 1990s, a second fundamental facet of motivation started to receive more attention within the SDT-literature. The focus was not so much on the experiential reasons underlying people's activity-engagement, but the focus shifted to the type of goals people hope to achieve through their activity engagement. More than 20 years ago, Kasser and Ryan (1993) showed, for the first time within the SDT-literature, that not all life goals are created equal. That is, to the extent that people organize their lives around the pursuit of extrinsic goals, such as financial success, image and attractiveness,

at the cost of pursuing intrinsic goals, such as community contribution, health and alienation, negative effects on well-being were reported (Kasser & Ryan, 1993; Kasser & Ryan, 1996; Vansteenkiste, Soenens, & Duriez, 2008).

Yet, the introduction of the intrinsic-extrinsic goal distinction created confusion and elicited criticism. The distinction confused at least some scholars because the same terminology, that is, 'intrinsic-extrinsic' was used again, this time in reference to goal-contents rather than underlying regulations. More importantly, the added value of considering goal-content above motives was questioned (Carver & Baird, 1998; Srivastava, et al., 2001). Specifically, the distinction between intrinsic-extrinsic goals would completely parallel the autonomous-controlled motivation distinction such that (a) both sets of concepts would correlate perfectly and (b) there would be no unique correlates being associated with goal-contents after controlling for motives.

With respect to the relation between both dimensions, past research has shown that both sets of concepts are distinct. That is, although intrinsic goal pursuits typically are regulated on the basis of relatively volitional motives and extrinsic goals are, on average, regulated by more controlled motives, there is no perfect one-to-one association between both sets of motivational constructs. With respect to the unique predictive validity of goal-contents above regulations, the evidence so far has been mixed. For instance, Sheldon et al. (2004) reported in a series of four studies that intrinsic, relative to extrinsic, goal striving related uniquely to well-being beyond the autonomous and controlled motives underlying goal striving. In contrast, Sebire and colleagues (Sebire, Standage, & Vansteenkiste, 2009, 2011) found that goal-contents only yielded an independent association with well-being, but not with physical activity levels. In Chapter 5, we aimed to further explore this issue in the context of eating regulation. First, the "What" and "Why" of motivation underlying eating regulation were correlated only moderately, indicating that these two facets of motivation

can be differentiated with regards to eating regulation as well. Second, the goals and motives each yielded unique associations with eating outcomes, indicating that both facets of motivation contribute independently to eating outcomes.

Given these findings, it seems important to further investigate both the "What" and "Why" of motivation in relation to eating outcomes. Future studies could, for instance, examine specific processes that might be involved in extrinsic versus intrinsic goal-pursuit. The pursuit of extrinsic goals would predict maladaptive outcomes because of the outward orientation of these goals (Kasser, Ryan, Couchman, & Sheldon, 2004; Vansteenkiste, et al., 2008). That is, the outward character of extrinsic goals would evoke evaluative processes, such as social comparison, contingent self-worth, and self-objectification, thereby drawing attention away from full absorption into the activity at hand. Appearance-focused dieters, for instance, might compare themselves more often with other dieters and take on a third-person or observer perspective towards their own body. Such appearance-based comparisons and self-objectification might result occasionally in feelings of pride and contingent self-acceptance, but at other times in feelings of shame, disappointment, and inferiority (Noll & Frederickson, 1998; Quinn, Kallen, Twenge, & Frederickson, 2006). In turn, such contingent self-acceptance might elicit need frustrating experiences. The pursuit of health goals would result less easily in an evaluative approach, as such goals would rather stimulate an inward orientation, that is, a focus on improving feelings of fitness and vitality.

Finally, it is also important to study the longitudinal dynamics between goals and motives. For instance, appearance-focused dieters might, over time, develop more external and introjected motives for eating regulation and vice versa. Similarly, reciprocal relations between health goals and autonomous motives might emerge. The type of regulation elicited over time may even partially explain the relation between goal-contents and eating outcomes. Further, it would be interesting to examine in greater detail

whether specific combinations of goals and motives yield particular (mal)adaptive effects. For instance, are appearance-focused dieters who manage to autonomously regulate their eating regulation efforts equally at risk for adverse eating outcomes, or do their autonomous motives protect against the harmful correlates of appearance-focused eating regulation? Similarly, are the positive outcomes of health-focused eating regulation also present if dieters are pressured to be focused on their health? Not only a variable-centered but also a person-centered approach could be used in examining these "What"-"Why" combinations. That is, it could be examined which combinations of goals and motives for eating regulation are more likely to co-occur and which motivational profiles yield the most adaptive eating outcomes.

On the Differential Role of Need Satisfaction and Need Frustration

Given its historical focus on processes fostering growth and well-being, SDT could provide the much needed theoretical basis for the positive psychology movement (Sheldon & Ryan, 2011). Indeed, SDT has a clear meta-theoretical basis, that is, a viewpoint on human nature. It is maintained that humans have an inherent pro-active nature which is oriented towards increasing levels of growth and integration. However, this growth does not take place automatically as it requires support in the form of the satisfaction of the psychological needs for autonomy, competence, and relatedness. These needs thus represent required nutrients (Ryan & Deci, 2008) for the potential for pro-activity and growth to unfold. In line with this hypothesis, dozens of studies have reported positive associations between psychological need satisfaction and well-being, both at the between-person level (Ryan, Huta, & Deci, 2008) and the within-person level (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Ryan, Bernstein, & Brown, 2010; Sheldon, Ryan, & Reis, 1996) and both at the general and domain-specific level (for an overview see Vansteenkiste, et al., 2010). Although SDT was primarily oriented towards predicting positive outcomes (e.g., prosocial behavior,

intrinsic motivation, engagement), over time, SDT scholars increasingly included indices of ill-being and psychopathology (e.g., Strauss & Ryan, 1987), thereby demonstrating that the deprivation of need satisfaction is related to ill-being (Vansteenkiste & Ryan, 2013).

Recently, the focus in the SDT-literature has started to shift away from merely considering the lack of need satisfaction to studying also the active obstruction and frustration of the psychological needs. These studies demonstrated that need frustration is related to diverse adverse outcomes, such as physical symptoms of acute stress, disordered eating, burnout, depressive symptoms and negative affect (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011; Stebbings, Taylor, Spray, & Ntoumanis, 2012). These studies were primarily conducted in the domain of sports. The present dissertation extends this body of work by investigating in greater detail the role of need frustration in relation to both adaptive and maladaptive eating outcomes. It was expected that need satisfaction would relate to healthy eating, whereas the experience of need frustration would relate to disordered eating symptoms. In line with this expectation, need frustration vis-à-vis one's eating regulation efforts was found to relate to disordered eating symptoms, that is, binge eating symptoms and drive for thinness (see Chapters 3 to 6). In contrast, need satisfaction was found to relate to adaptive outcomes, that is, healthy eating behaviours and weight-loss, but not to disordered eating symptoms.

Interestingly, need frustration does not necessarily need to occur in relation to eating regulation efforts to predict eating outcomes. On days people reported experiences of need frustration in general in their lives, they also reported having engaged more in binge eating symptoms (see Chapter 6), much like daily experiences of need satisfaction have been found to relate to daily experiences of well-being and vitality. Most recently, Boone, Vansteenkiste, Soenens, Van Der Kaap-Deeder and Verstuyf (in press) reported that experiences of general need frustration did not only relate to

binge eating concurrently, but also predict increases in binge eating over a 6-month period. To sum up, there is growing evidence confirming the claim that psychological need frustration is associated with disordered eating symptoms, whereas psychological need satisfaction is related to healthy eating behaviours. Therefore, the psychological needs seem to provide a unifying principle in the domain of eating behaviours, through which the literatures on body image concerns and disordered eating as well as the literature on healthy eating and weight loss can be bridged.

Although the current dissertation provided preliminary evidence for the distinct role of need satisfaction and frustration, many questions remain unanswered. First, the pathways that connect psychological need satisfaction and need frustration to healthy and disordered eating behaviours deserve greater attention. For instance, are binge eating symptoms a sign of energy-depletion and exhaustion, do dieters actively defy dietary rules when their needs are frustrated or does defiance emerge when energy gets increasingly depleted? Second, in most studies, the three needs were examined together, rather than looking into the role of the three needs separately. In the current dissertation, the three needs could not be examined separately in each study, because of the high intercorrelation between the three needs, which created problems of multicollinearity. Further, satisfaction and frustration of each of the three needs was assessed through four items, two of which assessed satisfaction and two of which assessed frustration. Because of the low number of items, the reliability of the separate need satisfaction and need frustration scales was often too low to be included as separate predictors in the studies in this dissertation. Perhaps future studies could include more items to measure need satisfaction and need frustration, thereby allowing an examination of the distinct role of autonomy, competence, and relatedness in relation to eating behaviours. Third, in the current dissertation, mixed evidence was obtained for the intervening role of need satisfaction and frustration between the goals and motives underlying eating regulation and eating behaviours. It is difficult to draw conclusions on these mixed findings,

given that need satisfaction was not included consistently in the studies throughout the dissertation. It seems important, for future studies, to include simultaneously need satisfaction and need frustration in a more systematic manner such that a clearer picture on the differential intervening role of need satisfaction and frustration can be drawn.

Can the Obtained Findings be Generalized?

In the General Introduction, we elaborated upon the epidemiologic increase in overweight and obesity and its associated physical and psychological risks (Ogden, et al., 2007). Given this trend, one could argue that any means to motivate overweight individuals into behaviour change would be beneficial, even if this leads to feelings of pressure and a focus on appearance. Perhaps, because overweight individuals are so much in need of behavior change, getting them oriented on altering their appearance and increasing pressure on their functioning might not come with a cost. Said differently, the harmful correlates of controlled and appearance-focused eating regulation might apply only to individuals with normal weight. The correlates of appearance-focused and controlled regulation may also vary with age. Because adolescents are more vulnerable to sociocultural pressures (Groesz, et al., 2002), controlled and appearance-focused eating regulation may relate more strongly to disordered eating symptoms among younger girls compared to a more mature group of women. That is, more mature women may have learned how to cope with these sociocultural pressures. In contrast, based on the universality claim within SDT, one could argue that controlling motives and extrinsic goals are bad for everyone, given their interference with genuine need satisfaction (Chen, 2013)

Throughout Chapters 3 to 5 of this dissertation, evidence was obtained for the proposed motivational mechanisms in diverse samples. For instance, the relation between motivation and eating outcomes was investigated among adolescent girls (Chapter 3) and adolescent and adult self-declared dieters (Chapters 4, 5). In each of these subsamples, evidence pointed towards the

same direction, with appearance-focused eating regulation and controlled motivation relating to negative eating outcomes and with health-focused eating regulation and autonomous motivation relating to positive eating outcomes. Similarly, the role of psychological needs on eating outcomes was investigated among adolescent girls (Chapter 3), adolescent and adult self-declared dieters (Chapter 4, 5) and young adult women (Chapter 6), again indicating that need frustration relates to adverse eating outcomes and need satisfaction to positive eating outcomes in these diverse samples. Further, within Chapters 4 and 5, diverse groups of self-declared dieters were sampled, which allowed for a direct comparison of the proposed motivational dynamics across self-declared dieters of varying weight status and age group. These tests yielded no evidence for differences in the structural relations between motivational variables and eating outcomes between these groups of self-declared dieters. Together then, these results indicate that the motivational mechanisms, as proposed in Chapter 2, can be generalized across individuals of varying age and weight.

Importantly, the universality claim of SDT does not preclude the possibility that diverse groups vary in the extent to which they feel controlled or focus on appearance during their eating regulation. Indeed, in line with the sociocultural trends described above, overweight and adolescent self-declared dieters were found to experience more pressures and are more focused on appearance goals compared to normal-weight and adult self-declared dieters. Given that these types of motivation yield similar harmful correlates in these two groups compared to adult and normal-weight self-declared dieters, one could argue that adolescent and overweight persons are at greater risk to experience disordered eating symptoms compared to adult and normal-weight persons who display a more adaptive motivational profile. In line with this hypothesis, overweight self-declared dieters reported more binge eating symptoms and concerns over eating and weight compared to normal-weight self-declared dieters in Chapter 5,

although no significant differences were found between adolescent and adult self-declared dieters.

In the current dissertation, most samples consisted of female participants. Eating regulation efforts are more common in women, compared to men (Field, et al., 2010). Nevertheless, it remains important to investigate whether the motivational model can also be generalized to male participants in future studies. Are men in general less likely to experience pressures for eating regulation? And, if pressured, do these pressures also yield disordered eating symptoms as they do in women? In Chapter 7, some preliminary evidence was obtained that, among adolescent boys, adoption of the muscular ideal relates to appearance-focused eating regulation in a similar vein as adoption of the thin-ideal relates to appearance-focused eating regulation in women. Further, studies within the domain of body image, have found that experimental exposure to the muscular ideal causes body image concerns among boys much like the exposure to the thin-ideal causes body image concerns among girls (Diedrichs & Lee, 2010; Flament et al., 2012). However, the question whether appearance-focused and controlled eating regulation relates to disordered eating outcomes in both boys and girls remains to be examined in future studies.

Part III. Limitations

The present dissertation is characterized by a number of methodological limitations. First, although cross-sectional, diary and longitudinal data were collected to examine the relation between motivation and eating outcomes, all of these methods are correlational in nature. Such a correlational design excludes the possibility of drawing conclusions on the direction of effects. For instance, we proposed that binge eating symptoms and excessive concerns over eating and weight follow from psychological need frustration. However, it might also be the case that psychological need frustration follows from binge eating symptoms and excessive concerns. In line with this, a recent study (Boone et al., in press), examined reciprocal

relations between need satisfaction, need frustration and binge eating symptoms. It was found that need frustration predicted increases in binge eating symptoms, whereas binge eating symptoms predicted decreases in need satisfaction over time. Also, the possible reciprocal relation between disordered eating outcomes and motivation was not examined. Nevertheless, disordered eating symptoms might have a profound impact on the type of motivation as well. For instance, dieters who lose control over eating, might over time develop more pressured motives (e.g., guilt) for eating regulation. Future studies could examine reciprocal relationships between motivation, psychological needs, and eating outcomes.

Another limitation was that the employed measures were self-reported. Because of this, common-method variance, in which shared variance is attributable to the common measurement method rather than to the content-based relation between the assessed constructs, is more likely to occur. Common-method variance could be reduced in future studies by including observational or behavioral measurements.

Further, two chapters used a diary approach to measure the intended constructs more proximally, thereby reducing the retrospective bias and, thus, increasing the validity and reliability of the obtained results. These studies could be advanced by using experience-sampling methodology (e.g., Haedt-Matt & Keel, 2011) in which participants are asked to fill in the questionnaires at random times within the day. Such a method would strengthen the validity of the studies and would allow us to investigate more thoroughly and dynamically whether need frustration precedes or follows from disordered eating symptoms within the day.

Part IV. Clinical Implications

In spite of its limitations, the current dissertation yielded some interesting results that might be useful for health care providers who are involved in the treatment and prevention of eating and weight problems.

To Diet or not to Diet? Taking Motivation into Account

A question posed by many scholars in the field of dieting and weight loss over the past decades is whether overweight and obese persons should or should not be recommended to diet (Mann, et al., 2007; Wing & Hill, 2001). Based on results of the current dissertation, one could argue that the most pertinent question is perhaps not so much whether overweight persons should or should not regulate their eating behaviours, but why they do so in the first place and which goals they want to achieve by their eating regulation. Indeed, dependent on the type of motivation, differential associations with weight loss, but also with other eating outcomes, such as healthy eating, binge eating symptoms, excessive concerns over eating and weight and exhaustion were found.

Further, it seems important to take into account the basic psychological needs of clients. That is, based on the current dissertation, we can hypothesize that clients who feel volitional, competent and connected to others during their eating regulation efforts will report more positive eating outcomes, whereas feeling pressured, incapable and isolated during the process of eating regulation would relate to negative eating outcomes. Therefore, it seems important to include a motivational perspective in the treatment of eating and weight problems.

One possibility would be to include a motivational phase prior to treatment. Such a suggestion follows from past work which demonstrated that increasing autonomous motivation for changing eating behaviours during treatment results in more effective interventions. For instance, the inclusion of a motivational intervention to increase autonomy resulted in more weight loss for those individuals displaying controlled motivates for dieting at baseline (Webber, Gabriele, Tate, & Dignan, 2010). Further, creating a motivational phase in a residential setting for patients with an eating disorder resulted in less treatment drop-out (Vandereycken & Vansteenkiste, 2009). In addition, multiple studies have investigated the role of *Motivational Interviewing* (MI; Miller & Rollnick, 2002) in promoting

individuals' motivation for working on eating and weight problems. MI is a client-centered and directive method for increasing internal motivation to change, by exploring ambivalence and discrepancies about change (Miller & Rollnick, 2002). The "spirit" of MI includes principles of collaboration, empathy, evocation of internal motivation, supporting self-efficacy, and client autonomy, which are closely related to a need supportive style as described in SDT (Vansteenkiste, Williams, & Resnicow, 2012). In the domain of diet (often combined with exercise) clear evidence was obtained that including MI resulted in moderate to strong effect sizes on behaviour change and maintenance (i.e., healthy eating, decreased caloric consumption, increased physical activity, weight loss) compared to advice or no treatment (Martins & McNeil, 2009). For instance, including a MI-session of at least 60 minutes, resulted in 81% of studies into better treatment outcomes (Rubak, Sandboek, Lauritzen, & Christensen, 2005). MI thus has proven its clinical utility in the domain of diet and exercise, although it was not always shown that MI improves treatment outcomes over and above traditional treatments (Martins & McNeil, 2009). As for disordered eating, evidence was obtained that including MI improves treatment outcomes in binge eating behaviours, but not in anorectic and drastic compensatory behaviours (Dray & Wade, 2012). Together then, in line with the hypothesis that a motivational perspective should be included in treatment of eating and weight problems, MI has proven clinically relevant, at least in the domains of eating regulation and binge eating symptoms.

It is important to note that, in spite of the similarities listed above, there are also some important differences between MI and SDT (Vansteenkiste, et al., 2012). For instance, MI is primarily concerned with increasing internal motivation for behaviour change (Miller & Rollnick, 2002). From the perspective of SDT, not all types of internal motivation would relate to optimal behaviour change. In particular, although introjected motivation is a form of internal motivation, it is associated with feelings of pressure and was found to be a maladaptive motivational subtype, as also

shown in Chapter 4 among the participants attending a Weight Watchers program. Within SDT, it is deemed important to guide individuals away from such internally pressuring motives towards a more volitional endorsement of change. Second, from the perspective of SDT, the primary goal of a motivational phase would not necessarily be to increase motivation to change. Instead, the goal would be to guide clients through a thorough reflection upon the personal relevance and goals of eating regulation, which may result in a more autonomous motivation to regulate eating behaviours, but which might just as well result in an autonomous decision not to change, at least for the time being. In other words, the primary outcome of a motivational intervention would involve the promotion of autonomy as such, rather than the promotion of readiness for behaviour change (Ryan, Lynch, Vansteenkiste, & Deci, 2011). Third, MI has been applied prior to or in replacement of traditional treatments. However, within SDT, a need supportive relationship is considered critical throughout the treatment. That is, the need supportive style is considered an important underlying attitude throughout the entire treatment, because of which some therapeutic techniques cannot be combined with the underlying meta-theory of SDT (Ryan, et al., 2011).

Given that a need supportive style is considered an important underlying attitude in SDT, therapeutic techniques can be evaluated in terms of their influence on motivation and psychological needs. One technique that deserves more research attention in terms of its influence on motivation and basic psychological needs is the use of rewards to stimulate behaviour change. From the perspective of SDT, the use of rewards would likely elicit external regulation for behavior change (Deci & Ryan, 2000). As long as rewards are given, they may elicit behavior change, yet, once the rewards are no longer attached to behaviour change, the motivation for pursuing change and the effective behaviour change would fade out (Deci, Koestner, & Ryan, 1999). Although most of the work on rewards in the SDT literature was done in the lab, research in the field of weight loss has shown that financial

incentives are successful at initiating weight loss, but that weight is regained once the incentives are no longer given (Jefferey, 2012). Indeed, a systematic review of randomized controlled trials of behavioural treatments for obesity and overweight involving the use of financial incentives showed no significant effect of the use of financial incentives on weight loss or maintenance at 12 months and 18 months. At 30 months, the researchers even observed a trend for weight gain (Paul-Ebhohimhen & Avenell, 2008). Further, Moller, McFadden, Hedeker and Spring (2012) found that participants who focus on financial incentives during an intensive diet and exercise intervention lost less weight during the intervention and gained more weight during the maintenance phase when compared to participants who scored lower on financial motives for change.

Importantly, according to SDT, the reason why rewards fail to promote sustained behaviour changes is because they come to undermine the inherent enjoyment of the activity (i.e., intrinsic motivation). In line with this hypothesis, numerous experimental studies confirmed that rewards lower the enjoyment and sustained engagement in tasks which were inherently enjoyable at baseline (Deci, et al., 1999). The promotion and sustenance of enjoyment for eating regulation seems critical though, as intrinsic motivation for eating regulation predicted long-term changes in participants of a Weight Watchers program (see Chapter 4). An important question then is whether rewards undermine such intrinsic motivation in the context of eating regulation? Only one study has investigated this issue: Moller, Buscemi, McFadden, Hedeker and Spring (2013) investigated the relationship between financial motivation to participate in a weight loss intervention and changes in enjoyment. They found that high financial motivation predicted negatively changes in liking fruits and vegetables and physical activity, whereas it positively predicted changes in liking foods high in saturated fat. Upon a further detailed examination of these effects, it appeared that especially participants with low financial motivation increased in their enjoyment of health behaviours, whereas participants high in

financial motivation showed only little changes compared to baseline measures. Therefore, these authors concluded that high financial motivation suppresses participants' potential for growing to enjoy health behaviours and dislike health behaviours. Given that, in Chapter 4 in the current dissertation, intrinsic motivation (i.e., enjoyment of eating regulation) was found to be a predictor of adaptive changes on a variety of eating outcomes, it seems important to further investigate the potential undermining effect of financial incentives on behaviour change. Future studies could, for instance, compare motivational interventions aimed at increasing external regulation (e.g., through the use of rewards) to motivational interventions aimed at evoking autonomous motivation in clients (e.g., making use of techniques described within MI).

Importantly, the extent to which rewards are motivating or rather undermine enjoyment and sustained behavior change also depends on the way incentives are given. To convey this idea, Deci and Ryan (1985) invoked the term functional significance. That is, the meaning attributed to the reward by the recipient will determine its effect. Specifically, rewards can be perceived either as being more informational or as being more evaluative. As a result of the varying meaning assigned to the rewards, the psychological needs of the recipient would be satisfied or frustrated to varying degrees. For instance, rewards which are contingent upon effective change rather than on effort put into change might undermine feelings of competence and even elicit helplessness if efforts fail to be translated into weight loss. Also, the offering of rewards could fundamentally change the therapeutic relationship if rewards are offered by health counselors themselves rather than by an external entity. That is, if the health counselor introduces rewards, the development of a collaborative relationship might be threatened as the health counselor needs to adopt an evaluative stance, which conveys a sense of conditional acceptance to the client. This potential undermining effect of rewards on therapeutic alliance may be reduced if an external entity delivers the rewards. Finally, rewards might also undermine

autonomy if not the client herself, but rather the therapist or an external entity decides when rewards are earned. In line with these hypothesis, Paul-Ebhohimhen and Avenell (2008) found a trend in favour of using rewards for behaviour change rather than weight change, rewards based on group performance rather than individual performance, and rewards delivered by non-psychologists rather than by psychologists. It is important to note though that, also in studies using such rewards, no significant effects were found over longer periods of time.

Looking Beyond Eating Regulation: The Role of Psychological Needs in General Life

The current dissertation also underlines the importance of looking beyond motivation for eating regulation as such. Underneath the presence of problematic eating behaviour may be deeper problems, which would need to be handled as well. These deeper problems might be revealed through the frustration of people's psychological needs in general in their lives rather than with respect to their eating behavior in particular. Indeed, the day-to-day variation in need frustration was found to relate to day-to-day variation in binge eating symptoms, which may be engaged in to compensate for the experienced need frustration. If interventions focused only on eating regulation, they might fail to capture a more fundamental underlying dynamic, which would need to be given equal or even more importance. That is because the foundations of a strong focus on body image and disordered eating symptoms may be found in severe and/or chronic need frustrating experiences in the general lives of clients. As a result, health counselors might focus on increasing need satisfying experiences as well as on decreasing need frustrating experiences (Ryan, et al., 2011; Vansteenkiste & Ryan, 2013). By guiding them towards the engagement in more need satisfying activities, health counselors can help to awaken the inherent growth-tendency of clients. For instance, the therapist could ask the client to think of activities or memories that offered great enjoyment and satisfaction

to the client and, then, ask which characteristics of these activities were important for the client. Clear insight in which activities are need satisfying for a client can serve as a trigger for engaging more often in these activities, thereby increasing well-being.

Further, it seems important to investigate the foundation of need frustration within the lives of clients. For instance, some clients might live in a context which actively thwarts their basic needs for autonomy, competence, and relatedness. The therapist might guide clients in their reflection on their lives and on how they can take better care for themselves and their inherent needs. Sometimes, this might involve taking important decisions to change the context in which one lives, for instance, leaving an abusive or emotionally neglecting partner or resigning from a stressful job. However, at times, need frustrating circumstances are difficult to change, in which case clients are helped more by teaching them skills to cope with need frustrating experiences. Within SDT, capacities for mindfulness and autonomous functioning have been described as factors of resilience in overcoming need frustrating experiences (Brown, Ryan, Creswell, & Niemiec, 2008; Vansteenkiste & Ryan, 2013). Indeed, SDT has posited that autonomous regulation depends on an authentic awareness of what is occurring in the moment. Although foundations of autonomy and mindfulness in themselves can be found in a need supportive context when growing up (Ryan, 2005), the therapist might also focus on enhancing these skills within a therapeutic setting.

Some Guidelines on Prevention

One of the advantages of a comprehensive motivational model is that this model offers guidelines on the treatment of ill-being as well as on the fostering of growth and well-being. Therefore, based on the model and empirical results of this dissertation, we can offer some suggestions for the prevention of disordered eating symptoms that might extend to the prevention of ill-being in general.

First, need satisfaction was related to healthy eating behaviours in the current dissertation. Therefore, providing a need supportive context to youngsters might foster the development of a healthier lifestyle. In line with this hypothesis, need supportive parenting was found to relate to more experienced need satisfaction which, in turn, predicted less body image concerns and disordered eating symptoms (Thogerson-Ntoumani, Ntoumanis, & Nikitaras, 2009). Further, a need supportive context is hypothesized to provide the foundation for an autonomous orientation in life (e.g., Vansteenkiste & Ryan, 2013). Such a general autonomous orientation has been found to protect women against sociocultural influences on body image and disordered eating symptoms (Pelletier, Dion, & Levesque, 2004). Further, a general autonomous orientation protected women from experiencing shame in a body-objectifying situation, such as trying on a swim suit in public (Mask & Blanchard, 2011).

Further, the general autonomous and the general controlled orientation were related differentially to identity styles, with a general autonomous orientation being related to an information-oriented identity style and with a general controlled orientation being related to a normative identity style (Soenens, Berzonsky, Vansteenkiste, Beyers, & Goossens, 2005). In the current dissertation, an information-oriented style predicted less adoption of the body perfect ideal which, in turn, predicted less appearance-focused eating regulation. An opposite relationship was found between a normative identity style and adoption of the body perfect ideal. Finally, a general autonomous orientation also predicts autonomous motivation for eating regulation (Pelletier & Dion, 2007), which was found to relate to more adaptive and less dysfunctional eating outcomes in the current dissertation. Taken together, a general autonomous orientation, which is grounded in growing up in need supportive environments, seems a resilience factor that protects girls from sociocultural pressures surrounding body image and eating behaviours, thereby possibly decreasing the odds of developing eating and weight problems.

Second, prevention efforts might also aim to support youngsters in the development of a strong "inner compass" through reflection about values and goals that personally matter to them (Assor, 2012). In current society, the pursuit of extrinsic goals, such as fame, attractiveness and wealth, are on the rise (Twenge et al., 2010) which may, at least partially, be caused by a culture in which youngsters are exposed frequently to advertisements communicating the message that these goals would bring happiness and well-being (Dittmar, 2007; Evans, 2003; Groesz, et al., 2002; Sheldon, Gunz, Nichols, & Ferguson, 2010). A focus on extrinsic goals, however, was found to predict less well-being and happiness, especially when compared to the pursuit of intrinsic goals which do foster wellbeing and happiness (Dittmar, 2007; Kasser & Ryan, 2001; Van Hiel & Vansteenkiste, 2009).

Thus, prevention could focus on lowering the pursuit of extrinsic goals as well as on stimulating the pursuit of intrinsic goals. Indeed, brief interventions on goal-pursuit were found to have effects on several indicators of well-being. For instance, when youngsters were invited to think about personally important goals, they increasingly focused on intrinsic goals (Crocker, Niiya, & Mischkowski, 2008) and they reported more prosocial feelings and behaviours (Crocker, et al., 2008; Thomaes, Bushman, de Castro, & Reijntjes, 2012). Also, brief interventions in which intrinsic values were emphasized resulted in better grades, health and well-being (Vansteenkiste, Lens, & Deci, 2006; Walton & Cohen, 2011).

The preventive effects of such brief interventions on disordered and healthy eating behaviours were not yet examined. Preventive research on eating disorders did, however, already investigate the effect of stimulating youngsters to think critically about the body perfect ideals. These interventions were found to reduce adoption of the thin-ideal in girls which, in turn, prevented girls from developing disordered eating behaviours (Stice, Rohde, Gau, & Shaw, 2012; Stice, Rohde, Shaw, & Gau, 2011; Thompson & Stice, 2001). Future studies could investigate whether stimulating the engagement in intrinsic goals, rather than merely challenging the pursuit of

extrinsic goals, would yield a similar preventive effect on disordered eating. That is, the development of a strong "inner compass" might present a resilience factor, which not only protects youngsters against disordered eating, but which also has benefits in terms of other health and risk behaviours and well-being in general.

General Conclusion

An important question to end this dissertation is whether the comprehensive motivational model, presented in Chapter 2 and further examined throughout Chapters 3 to 7, represents a step forward in our knowledge of healthy and disordered eating outcomes. Based on empirical results in Chapters 3 to 5, we can conclude that the type of motivation matters, with autonomous motives and health goals representing a better quality of motivation compared to controlled motives and appearance goals. Further, throughout Chapters 3 to 6, need frustration was found to relate to dysfunctional eating outcomes, while need satisfaction was related to adaptive eating outcomes. Thus, the basic psychological needs can be used as a unifying principle to bridge growth- and health-oriented research and research on psychopathology and disordered eating outcomes. Notably, the proposed motivational dynamics were found to generalize across age and weight status, indicating that the model can be applied among both women and men and among both normal-weight and overweight individuals. Although much more research is needed and directions for future research were provided, it seems that the proposed motivational model is one step forward towards the development of a more encompassing model on eating regulation.

Nederlandstalige Samenvatting

Telt de Kwaliteit van Motivatie? Een Onderzoek naar de Relatie tussen Doelinhoud, Zelf-Regulatie en Eetgedrag

Eetregulatie is een belangrijk thema in het leven van veel vrouwen en, in mindere mate, in het leven van mannen (Serdula, et al., 1999). Ondanks veelvuldig onderzoek naar de gevolgen van eetregulatie is het tot op heden niet duidelijk of eetregulatie positieve dan wel negatieve gevolgen meebrengt. Onderzoek leverde immers tegenstrijdige resultaten op, waarbij eetregulatie in sommige studies symptomen van verstoord eten, zoals controleverlies over eten en piekeren over eten en gewicht, voorspelde (bijv., Liechty & Lee, 2013; Stice, Davis, Miller, & Marti, 2008), terwijl eetregulatie in andere studies samenhing met een verbetering in deze symptomen (bijv., Goodrick, Poston, Kimball, Reeves, & Foreyt, 1998; Reeves et al., 2001). Verder bleken interventiestudies, die gericht zijn op het veranderen van het eetpatroon bij individuen met overgewicht, wel korte termijn successen mee te brengen, maar op lange termijn bleek slechts een minderheid van diëters het gewichtsverlies te kunnen behouden (Mann, et al., 2007).

Onderzoekers zijn dan ook verdeeld over het (on)wenselijk karakter van eetregulatie, waarbij sommigen ervoor pleiten om elke vorm van beperking op het eetpatroon te ontmoedigen bij patiënten met overgewicht (bijv., Wooley & Garner, 1991; Mann, et al., 2007), terwijl anderen op zoek gaan naar een verklaring waarom een minderheid van diëters er wel in slaagt om gewichtsverlies te bereiken en te handhaven (bijv., Elfhag & Rössner, 2005). Hierbij werd recent gepleit voor het ontwikkelen van overkoepelende theoretische modellen, die zowel de positieve als negatieve gevolgen van eetregulatie verklaren (bijv., Ogden, 2010; Stroebe, van Koningsbruggen, Papies, & Aarts, 2013).

In lijn met deze oproep wordt in het huidige doctoraatsproefschrift aandacht geschonken aan het type motivatie onderliggend aan eetregulatie. Dit type motivatie wordt in verband gebracht met diverse uitkomsten, waaronder symptomen van verstoord eetgedrag (i.c., controleverlies over eten en piekeren over eten en gewicht), gezonde eetgewoontes, gevoelens van uitputting en gewichtsverlies. De Zelf-Determinatie Theorie (ZDT; Deci & Ryan, 2000; Ryan & Deci, 2000), een grondig onderzochte en wetenschappelijk gevalideerde theorie over motivatie, persoonlijke groei en ontwikkeling (e.g., Vansteenkiste, Niemiec, & Soenens, 2010) vormt de rode draad doorheen dit doctoraatsproefschrift. De centrale hypothese doorheen het doctoraat is dat de uitkomsten van eetregulatie afhankelijk zijn van het type motivatie dat individuen er op nahouden om hun eetgedrag te reguleren. In wat volgt wordt een samenvatting geboden van de acht Hoofdstukken uit het doctoraat.

Hoofdstuk 1 – Inleiding

Eetregulatie in Perspectief Geplaatst

In de inleiding wordt de hoge prevalentie van eetregulatie gesitueerd tegen de achtergrond aan twee globale socioculturele evoluties. Ten eerste wordt er in de huidige Westerse samenleving veel belang gehecht aan het uiterlijk, waarbij *slankheid* geldt als een belangrijk criterium om de fysieke aantrekkelijkheid van vrouwen te beoordelen (Dittmar, 2007). In lijn hiermee zijn veel meisjes en vrouwen ontevreden over hun lichaam, waarbij ze verlangen naar een slankere lichaamsbouw (Tiggeman, 2004). Vooral individuen die het slankheidsideaal persoonlijk overnemen, blijken een groter risico te lopen op het ontwikkelen van lichaamsontevredenheid (Thompson & Stice, 2001). Restrictieve eetregulatie wordt hierbij beschouwd als een pad om deze slankere lichaamsbouw te bereiken. Ten tweede wordt de huidige Westerse samenleving bestempeld als een “toxische” of “obesogene” omgeving, waarin er een overaanbod is aan suiker- en vetrijk voedsel en een stijging in een sedentaire levensstijl

(Haslam & James, 2005). In lijn met deze trends is er een sterke stijging waarneembaar in de prevalentie van *overgewicht* en *obesitas* (WHO, 2008). Eetregulatie wordt binnen deze context vaak beschouwd als een adaptieve strategie om een gezonder lichaamsgewicht na te streven en te handhaven.

In lijn met deze twee trends richtte onderzoek zich op lichaamsontevredenheid en verstoord eetgedrag of op overgewicht en obesitas. Ondanks dat beide onderzoekdsomeinen veel aandacht besteedden aan eetregulatie, was er opmerkelijk weinig interactie tussen beide. Vanuit de literatuur rond *lichaamsontevredenheid* werden vooral de dysfunctionele gevolgen van eetregulatie in kaart gebracht waarbij men in het bijzonder aandacht schonk aan de samenhang tussen eetregulatie en controleverlies over eten (bijv., Polivy & Herman, 1985). Afhankelijk van het gehanteerde design en de gebruikte vragenlijsten om eetregulatie te meten werd het verband tussen eetregulatie en controleverlies bevestigd. Onderzoek geeft verder aan dat er - naast een groep van onsuccesvolle diëters - ook een groep van succesvolle diëters bestaat (bijv., Van Strien, 1999), maar de factoren die beide groepen differentiëren zijn tot op heden onduidelijk (bijv., Groesz & Stice, 2007).

Vanuit de literatuur rond *overgewicht en obesitas*, werden vooral de adaptieve gevolgen van eetregulatie op vlak van gewichtsverlies en gewichtsbehoud in kaart gebracht. Hierbij bleek de effectiviteit van dieetinterventies op lange termijn laag te zijn (bijv., Mann, et al., 2007). Toch blijkt een minderheid van diëters (10 tot 20%) wel in staat om een relatief bescheiden gewichtsverlies (10% verlies) te behouden gedurende minstens 1 jaar (bijv., Kraschenwksi et al., 2010; Wing & Hill, 2001). Momenteel zijn onderzoekers op zoek naar de processen die verklaren waarom deze minderheid van diëters hun gewichtsverlies succesvol behouden (Elfhag & Rössner, 2005). Onderzoeksbevindingen wijzen hierbij op het belang van het opbouwen van een gezondere levensstijl eerder dan het inperken van de voedselinname, en er zijn aanwijzingen dat motivatie, naast algemene factoren van welzijn en weerbaarheid, een belangrijke rol

kan spelen (Elfhag & Rössner, 2005). Desondanks ontbreekt een systematische theoretische onderzoekslijn naar het belang van de kwaliteit van motivatie voor eetregulatie (bijv., Teixeira, Silva, Mata, Palmeira, & Markland, 2012).

In dit doctoraat wordt op een theoriegedreven manier onderzocht welke relatie motivatie vertoont met gewichtsverlies, maar ook met meer diverse uitkomsten, zoals gezonde eetgewoontes, symptomen van verstoord eetgedrag (controleverlies en piekeren over eten en gewicht) en gevoelens van uitputting. Door diverse uitkomsten op te nemen kunnen diverse factoren in rekening worden gebracht om het succes van eetregulatie te evalueren veeleer dan enkel gewichtsverlies in rekening te brengen.

Zelf-Determinatie Theorie: De Relatie tussen Motivationele Factoren en Eetgedrag

Binnen de ZDT wordt aandacht geschonken aan twee verschillende aspecten van motivatie, namelijk de doelen (het "Wat" van motivatie) die mensen willen bereiken via hun gedrag en de motieven of types regulatie onderliggend aan hun gedrag (het "Waarom" van motivatie). Wat betreft doelinhoud wordt een onderscheid gemaakt tussen *intrinsieke doelen*, zoals het nastreven van vriendschap, persoonlijke ontwikkeling, een bijdrage leveren aan de maatschappij en gezondheid, en *extrinsieke doelen*, zoals het nastreven van populariteit, materiële rijkdom, imago en fysieke aantrekkelijkheid (Kasser & Ryan, 1993, 1996). Het nastreven en bereiken van intrinsieke doelen blijkt meer algemeen welzijn en levenstevredenheid te voorspellen, terwijl het nastreven en bereiken van extrinsieke doelen geen of een negatief verband houdt met algemeen welzijn en levenstevredenheid (bijv., Van Hiel & Duriez, 2008; Vansteenkiste, Soenens, & Duriez, 2008). In lijn met het onderscheid tussen extrinsieke en intrinsieke doelen kan eetregulatie gericht zijn op het veranderen of behouden van de fysieke *aantrekkelijkheid* of op het veranderen of behouden van de *gezondheid* en fitheid. Slechts één studie onderzocht deze hypothese en bevestigde dat op

aantrekkelijkheid gerichte eetregulatie samenhing met controleverlies over eten in een groep van vrouwelijke studenten (Putterman & Linden, 2004). In dit doctoraatsproefschrift werd hierop verder gebouwd in Hoofdstuk 3 door na te gaan of de doelen onderliggend aan eetregulatie differentieel samenhangen met controleverlies over eten nadat de mate of intensiteit van eetregulatie in rekening werd gebracht. Deze bevindingen werden in Hoofdstuk 5 uitgebreid door doelinhoud van eetregulatie in verband te brengen met een meer diverse set aan uitkomsten en na te gaan of de effecten van doelinhoud overeind bleven na het inbrengen van de motieven onderliggend aan eetregulatie in een diverse steekproef van adolescente en volwassen vrouwelijke diëters.

Naast het "Wat", wordt ook veel aandacht geschonken aan het "Waarom" van motivatie binnen de ZDT. Hierbij worden verschillende types motivatie onderscheiden van elkaar, waarvan sommige eerder gecontroleerd en andere eerder autonoom van aard zijn. Bij *gecontroleerde* motieven gaat het uitvoeren van een activiteit gepaard met een gevoel van druk en "moeten". Hierbij kan de druk van buitenaf komen, zoals wanneer mensen door vrienden of ouders onder druk gezet worden om hun eetgedrag te reguleren, hetgeen als *externe regulatie* benoemd wordt. De druk kan echter ook van binnenuit komen, waarbij personen hun eetgedrag reguleren om gevoelens van schaamte of schuld te vermijden of om hun zelfwaarde een "boost" te geven, hetgeen *geïntrojecteerde regulatie* reflecteert. Daartegenover staan meer autonome motieven, waarbij de activiteit eerder uitgevoerd wordt met een gevoel van keuze en "willen". Hieronder valt *intrinsieke* motivatie, waarbij een activiteit wordt uitgevoerd omwille van de interesse in en het plezier dat men beleeft aan de activiteit. *Geïntegreerde* regulatie verwijst naar het uitvoeren van een activiteit, omdat deze naadloos aansluit bij een geheel van persoonlijke levenswaarden en -doelen Ten slotte verwijst *geïdentificeerde* regulatie naar de persoonlijke waarde en betekenis die mensen toedichten aan de activiteit zelf. Zo kan een diëter gezonder eten omdat ze plezier beleeft aan het koken van gezonde

maaltijden (intrinsieke motivatie), omdat gezond eten een onderdeel vormt van het uitbouwen van een globalere gezonde en actieve levensstijl (geïntegreerde regulatie) of omdat ze persoonlijk het belang onderschrijft van meer gezonde voedingswaren te eten (geïdentificeerde regulatie). Voorgaande studies toonden reeds het belang aan van autonome en gecontroleerde motieven, waarbij autonome motieven voor eetregulatie meer gezond en minder verstoord eetgedrag voorspelden, terwijl een omgekeerd patroon werd teruggevonden voor gecontroleerde motieven (Pelletier & Dion, 2007; Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004). Het huidige doctoraatsproefschrift bouwde verder op deze bevindingen door na te gaan wat het verband was tussen motieven voor eetregulatie en veranderingen over tijd in diverse eetgerelateerde uitkomsten in een groep van diëters die deelnamen aan het programma van Weight Watchers (Hoofdstuk 4) en door na te gaan of de motieven voor eetregulatie een zelfde rol speelden in groepen (zelfverklaarde) diëters met een variërende gewichtsstatus (Hoofdstuk 4 en 5) en bij zowel laat-adolescente als volwassen zelfverklaarde diëters (Hoofdstuk 5).

Ten slotte wordt in de ZDT ook gesteld dat *psychologische basisbehoeften* de energetische basis vormen voor volgehouden gedragsverandering en, meer algemeen, voor groei en welzijn (Deci & Ryan, 2000; Ryan & Deci, 2000). Drie psychologische basisbehoeften worden onderscheiden, namelijk de behoefte aan autonomie (i.c., een gevoel van psychologische vrijheid en keuze), competentie (i.c., het gevoel in staat te zijn om vooruitgang te boeken en persoonlijke doelen te realiseren) en verbondenheid (i.e., een gevoel van wederkerige zorg, warmte en steun). Talrijke studies bevestigen het belang van de bevrediging van deze drie psychologische basisbehoeften voor het algemeen welzijn, de groei en adaptief functioneren in diverse levensdomeinen (bijv., Ryan, Huta, & Deci, 2008; Vansteenkiste, et al., 2010). Recent schenkt de ZDT ook meer systematische aandacht aan de "donkere" kant van het menselijk functioneren, namelijk het voorspellen van malfunctioneren en zelfs

psychopathologie. Hierbij zou frustratie, eerder dan enkel een gebrek aan bevrediging, van deze drie basisbehoeften een belangrijke rol spelen (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Vansteenkiste & Ryan, in druk). In lijn met deze stelling werd in Hoofdstuk 6 nagegaan of dagelijkse schommelingen in behoeftefrustratie hand in hand gaan met dagelijkse schommelingen in controleverlies over eten.

De psychologische basisbehoeften spelen niet enkel in het algemeen een belangrijke rol, maar ook binnen specifieke levensdomeinen. Zo kunnen mensen het gevoel hebben autonoom, competent en verbonden te zijn in het reguleren van hun eetgedrag (i.c., dieet-specifieke behoeftebevrediging) of ze kunnen daarentegen het gevoel hebben onder druk te staan, te falen en geïsoleerd te zijn in het reguleren van hun eetgedrag (i.c., dieet-specifieke behoeftefrustratie). Het verband tussen dieet-specifieke behoeftebevrediging en frustratie en symptomen van verstoord eetgedrag, gezonde eetgewoontes, gewichtsverlies en uitputting werd verder onderzocht in Hoofdstukken 3 tot en met 5. Hierbij wordt bovendien nagegaan of ervaringen van dieet-specifieke behoeftebevrediging en frustratie het verband tussen het "Wat" en "Waarom" van eetregulatie en de uitkomsten kunnen verklaren.

Globale Doelstellingen van het Doctoraat

In het licht van de huidige stand van zaken qua onderzoek naar de motivationele basis van eetregulatie, werden de volgende vijf globale doelstellingen nagestreefd in het doctoraat. Een eerste doelstelling was om een *overkoepelend theoriegedreven model* te ontwikkelen om het verband tussen motivationele factoren en eetgedrag te begrijpen. Zowel de positieve als de negatieve kant van eetregulatie werd hierbij belicht door diverse uitkomsten te bespreken. Deze doelstelling werd uitgewerkt in een overzichtsstudie in Hoofdstuk 2. Een tweede doelstelling was om de bijdrage van het *"Wat"* en *"Waarom"* van eetregulatie in het voorspellen van een diverse reeks uitkomsten na te gaan, namelijk symptomen van verstoord eetgedrag (controleverlies over eten en piekeren over eten en gewicht),

gezonde eetgewoontes, gewichtsverlies en gevoelens van uitputting. Deze doelstelling werd uitgewerkt in Hoofdstuk 3, 4 en 5. Een derde doelstelling omvatte de studie van het proces van (dieet-specifieke) *behoeftebevrediging* en *frustratie*. Zo werd het verband tussen algemene behoeftebevrediging en -frustratie en controleverlies over eten onderzocht in Hoofdstuk 6 en kregen dieet-specifieke behoeftebevrediging en -frustratie aandacht in de Hoofdstuk 3, 4 en 5. Een vierde doelstelling was om na te gaan of het motivationele profiel van zelf-verklaarde diëters verschilde in functie van hun *leeftijd* en *gewichtsstatus*. Verder werd ook onderzocht of de verbanden tussen het "Wat" en "Waarom" van eetregulatie en de uitkomsten vergelijkbaar waren in deze diverse groepen van diëters. Deze doelstelling werd onderzocht in Hoofdstuk 4 en 5. Een laatste doelstelling bestond erin om de antecedenten van op aantrekkelijkheid gerichte eetregulatie na te gaan, waarbij in Hoofdstuk 3 lichaamsontevredenheid en in Hoofdstuk 7 het persoonlijk overnemen van het schoonheidsideaal als potentiële antedecenten werden onderzocht. In Hoofdstuk 7 werd bijkomend vanuit een breder ontwikkelingspsychologisch kader onderzocht welke rol identiteitsstijlen spelen bij het overnemen van het schoonheidsideaal en de doelen onderliggend aan eetregulatie.

Hoofdstuk 2 – Motivationele Basis van Eetregulatie: Een Zelf-Determinatie Theorie Perspectief

In Hoofdstuk 2 werd een overkoepelend theoretisch model, gestoeld op de ZDT, ontwikkeld waarin de rol van motivatie op diverse aspecten van het eetgedrag werd besproken. Centraal binnen de ZDT staat de stelling dat de bevrediging van de drie psychologische basisbehoeften aan autonomie, competentie en relationele verbondenheid een rol spelen in het bevorderen van de persoonlijke groei en welzijn, terwijl de frustratie van deze behoeftes een rol speelt in de etiologie van psychopathologie (Vansteenkiste & Ryan, in press). Het principe van psychologische basisbehoeftes zou aldus zowel de positieve als de negatieve kant van eetregulatie kunnen belichten.

Ten eerste werd de rol van algemene psychologische behoeftebevrediging en -frustratie in de etiologie van verstoord en gezond eetgedrag besproken. Wanneer de psychologische basisbehoeften ondersteund worden, zou de inherente groeitendens van mensen geactiveerd worden, waardoor een gezondere levensstijl en een adaptiever motivationeel profiel voor eetregulatie ontstaat. Daartegenover staat dat het blokkeren of actief frustreren van deze basisbehoeften uitmondt in passiviteit of antagonistisch gedrag. Wanneer men in een behoeftefrustrerende omgeving vertoeft zal men op zoek gaan naar alternatieven om behoeftebevrediging te verkrijgen. Mensen kunnen zich hierbij richten op behoeftesubstituten (bijv., zich vastpinnen op het nastreven van een aantrekkelijk lichaam om aandacht en verbondenheid te ervaren) of compensatoir gedrag (bijv., zichzelf erg strikte dieetregels opleggen om een gevoel van competentie te verwerven) stellen. Hoewel dergelijke substitutaire en compensatoire gedragingen mogelijks op korte termijn stressreductie en opluchting meebrengen, zouden ze op lange termijn geen diepgaand gevoel van behoeftebevrediging op te leveren (bijv., Thogerson-Ntoumanis, Ntoumanis, & Nikitaras, 2010). Hierdoor kunnen personen verstrikt geraken in een zichzelf versterkende vicieuze cirkel waarbij men zich steeds sterker richt op behoeftesubstituten en compensatoir gedrag om gevoelens van behoeftefrustratie het hoofd te bieden, maar waardoor men op langere termijn steeds minder kansen creëert op diepgaande behoeftebevrediging.

Ten tweede werd de rol van psychologische behoeftebevrediging en -frustratie met betrekking tot eetregulatie besproken. Behoeftebevrediging en -frustratie kunnen een rol spelen in het ontwikkelen van een adaptief (i.e., focus op gezondheid en autonome motieven) dan wel dysfunctioneel (i.e., focus op aantrekkelijkheid en gecontroleerde motieven) motivationeel functioneren. Deze motivationele factoren onderliggend aan eetregulatie zouden op hun beurt dieet-specifieke behoeftebevrediging en frustratie uitlokken. Autonome motieven en een focus op gezondheid zijn meer adaptieve types van motivatie omwille van hun positieve verband met

psychologische behoeftebevrediging. Gecontroleerde motieven en een focus op aantrekkelijkheid worden beschouwd als meer dysfunctionele types van motivatie omwille van hun verband met psychologische behoeftefrustratie. Net daarom werd vooropgesteld dat dieet-specifieke behoeftebevrediging en frustratie een verklarende rol zouden spelen in het verband tussen motivatie en de diverse reeks van uitkomsten bestudeerd in dit doctoraat.

Ten derde werden de gelijkenissen en verschillen tussen de ZDT en frequent gebruikte en bestudeerde modellen in het onderzoeksdomein naar verstoord eetgedrag en eetregulatie besproken. Meer specifiek werd de ZDT vergeleken met het socioculturele model van lichaamsontevredenheid en adoptie van het schoonheidsideaal, met de Zelf-Objectificatie Theorie, de Dietary Restraint Theorie en de Zelf-Controle theorie. Er werd besloten dat toekomstig onderzoek naar de relatie tussen de ZDT en elk van deze theorieën van toegevoegde waarde zou kunnen zijn voor betrokken onderzoeksdomeinen.

Hoofdstuk 3 – Eetregulatie en Controleverlies: Differentiële Associaties van een Focus op Aantrekkelijkheid en Gezondheid

In Hoofdstuk 3 werd de rol van motivatie in het pad van eetregulatie naar controleverlies over eten onderzocht. Hierbij werd onderzocht (1) of de mate of intensiteit van eetregulatie voorspellend was voor controleverlies over eten via dieet-specifieke behoeftefrustratie, (2) of er differentiële associaties optraden tussen op gezondheid en op aantrekkelijkheid gerichte eetregulatie en dieet-specifieke behoeftefrustratie en controleverlies over eten en (3) of lichaamsontevredenheid samenhangt met de mate of intensiteit van eetregulatie en op aantrekkelijkheid en gezondheid gerichte eetregulatie. Deze onderzoeksvragen werden onderzocht in een steekproef van 244 vrouwelijke adolescenten (13 tot 19 jaar oud, gemiddeld 14.6) die aangaven dat ze minstens af en toe hun eetgedrag reguleerden. Het onderzoek was cross-sectioneel en alle concepten werden gemeten via zelf-rapportage vragenlijsten.

Uit de resultaten bleek ten eerste dat intensiteit van eetregulatie samenhing met controleverlies over eten. Ervaringen van dieet-specifieke behoeftefrustratie konden dit verband volledig verklaren, waarbij intensiteit van eetregulatie positief samenhing met dieet-specifieke behoeftefrustratie, hetgeen op zijn beurt positief samenhing met controleverlies over eten. Ten tweede bleken de doelen onderliggend aan eetregulatie differentiële verbanden te vertonen met dieet-specifieke behoeftefrustratie en controleverlies over eten. Meer bepaald bleek eetregulatie gericht op aantrekkelijkheid hand in hand te gaan met meer dieet-specifieke behoeftefrustratie, waardoor het ook meer controleverlies over eten voorspelde. In tegenstelling hiertoe, bleek eetregulatie gericht op gezondheid samen te hangen met minder dieet-specifieke behoeftefrustratie, waardoor het ook samenhing met minder controleverlies over eten. Ten slotte bleek lichaamsontevredenheid een voorspeller te zijn van intensiteit van eetregulatie en op aantrekkelijkheid gerichte eetregulatie, maar niet van op gezondheid gerichte eetregulatie.

Samenvattend suggereren deze bevindingen dat de doelen onderliggend aan eetregulatie en dieet-specifieke behoeftefrustratie een verklarende rol spelen in wanneer en waarom eetregulatie kan uitmonden in controleverlies over eten.

Hoofdstuk 4 – Tevergeefs Diëten? Longitudinale Associaties Tussen Motieven voor Eetregulatie, Eetgedrag en Gewicht bij Deelnemers aan een Weight Watchers Programma

In voorgaande studies werd het verband tussen autonome en gecontroleerde motieven en gezonde eetgewoontes en symptomen van verstoord eetgedrag reeds aangetoond, dit voornamelijk bij steekproeven van universiteitsstudenten. In Hoofdstuk 4 wilden we deze bevindingen uitbreiden door te onderzoeken of de motieven voor eetregulatie veranderingen in gewicht, gezonde eetgewoontes, symptomen van verstoord eetgedrag (controleverlies over eten en piekeren over eten en gewicht) en

gevoelens van uitputting konden voorspellen in een groep van individuen die deelnamen aan een commercieel programma voor gewichtsverlies (Weight Watchers). Bovendien werd nagegaan of dieet-specifieke behoeftebevrediging en frustratie het verband tussen de motieven en veranderingen in de uitkomsten konden verklaren. Ten slotte werd het motivationeel profiel van diëters onderzocht in functie van hun gewichtsstatus (normaal-gewicht, overgewicht, obesitas), waarbij er tevens werd nagegaan of de verbanden tussen de motieven en de uitkomsten vergelijkbaar waren in deze drie groepen.

Leden van de Vlaamse afdeling van Weight Watchers werden via een brief uitgenodigd om deel te nemen aan een online studie naar hun motivatie en eetgedrag. In totaal namen 458 diëters deel op tijdstip 1, waarvan 95.2% vrouwen (17 tot 74 jaar oud, gemiddeld 44.5). De BMI varieerde tussen 20.29 en 44.73 (gemiddeld = 27.85), waarbij respectievelijk 32.8%, 39.7% en 27.5% van de deelnemers een normaal gewicht, overgewicht en obesitas hadden. Op Tijdtip 2, 18 maanden na de eerste afname, namen 219 leden deel aan de studie, waarvan 60% nog steeds actief betrokken waren in het Weight Watchers programma. Analyses gaven aan dat de deelnemers die niet opnieuw deelnamen aan de studie geen verschillend profiel hadden op Tijdstip 1 in vergelijking met zij die wel opnieuw deelnamen.

Uit de resultaten bleek intrinsieke motivatie stijgingen in gezonde eetgewoontes en dalingen in gewicht, gevoelens van uitputting en piekeren over eten en gewicht, terwijl geïdentificeerde regulatie dalingen in controleverlies over eten en gevoelens van uitputting voorspelde. Geïntrojecteerde motivatie voorspelde stijgingen in gewicht, uitputting en piekeren over eten en gewicht, terwijl externe motivatie stijgingen in controleverlies over eten en piekeren over eten en gewicht voorspelde. Samengenomen bleken autonome motieven dus samen te hangen met adaptieve veranderingen in de uitkomsten, terwijl gecontroleerde motieven samenhingen met dysfunctionele veranderingen in de uitkomsten.

Ten tweede bleken stijgingen in dieet-specifieke behoeftebevrediging samen te hangen met stijgingen in gezonde eetgewoontes en dalingen in gewicht en gevoelens van uitputting, terwijl stijgingen in dieet-specifieke behoeftefrustratie samenhingen met stijgingen in controleverlies over eten, piekeren over eten en gewicht en gevolens van uitputting. De verklarende of mediërende rol van dieet-specifieke behoeftebevrediging werd slechts deels ondersteund. Meer bepaald voorspelden intrinsieke en geïdentificeerde motieven stijgingen in behoeftebevrediging, hetgeen het verband met uitputting verklaarde. De andere verbanden tussen de motieven en de uitkomsten werden niet verklaard door behoeftebevrediging. Wat betreft dieet-specifieke behoeftefrustratie was er geen evidentie voor een mediërend pad aangezien de motieven op Tijdstip 1 geen veranderingen in dieet-specifieke behoeftefrustratie konden voorspellen.

Ten slotte werd gevonden dat geïntrojecteerde en geïdentificeerde motieven de meest voorkomende motieven waren om het eetgedrag te reguleren. In de groep met overgewicht en obesitas bleek geïntrojecteerde motivatie zelfs de belangrijkste motivatie om het eetgedrag te reguleren. Het minst voorkomende motief was externe regulatie. Diëters met overgewicht en obesitas scoorden hoger op externe motivatie en lager op geïdentificeerde regulatie in vergelijking met diëters zonder overgewicht. De verbanden tussen motieven en de uitkomsten die hierboven besproken werden bleken vergelijkbaar in de drie afzonderlijke groepen.

Samengenomen blijkt de motivatie onderliggend aan eetregulatie differentiële verbanden met een diverse reeks aan uitkomsten te voorspellen. Het proces van dieet-specifieke behoeftesatisfactie en frustratie heeft een sterke relatie met de uitkomsten, maar er was slechts beperkte evidentie voor een mediërende rol. Diëters met overgewicht en obesitas blijken meer risico te lopen om een dysfunctioneel motivationeel profiel te vertonen.

Hoofdstuk 5 – Het "Wat" en "Waarom" van Eetregulatie bij Adolescente en Volwassen Diëters: Associaties met Gezonde Eetgewoontes en Symptomen van Verstoord Eetgedrag

In Hoofdstuk 5 werd onderzocht of het type doelen en motieven onderliggend aan eetregulatie differentieel geassocieerd waren met dieet-specifieke behoeftefrustratie, gezonde eetgewoontes en symptomen van verstoord eetgedrag (controleverlies over eten en piekeren over eten en gewicht) in een groep laat-adolescente en volwassen zelf-verklaarde diëters met en zonder overgewicht. Meer specifiek waren er vier doelstellingen. Ten eerste wilden we nagaan of het motivationeel profiel van diëters verschilde naargelang gewichtsstatus (overgewicht versus normaal gewicht) en leeftijdsgroep (laat-adolescent versus volwassen). Ten tweede werd onderzocht of doelen en motieven differentieel gerelateerd waren aan gezonde eetgewoontes, controleverlies over eten en piekeren over eten en gewicht. Ten derde werd de mediërende rol van dieet-specifieke behoeftefrustratie in de relatie tussen motivatie en uitkomsten onderzocht. Ten slotte werd getoetst of de relaties tussen de motieven en uitkomsten gelijkaardig waren binnen elke leeftijds- en gewichtsgroep.

Participanten waren 99 laat-adolescente (16 tot 23 jaar, gemiddeld = 18.9) en 98 volwassen (35 tot 55 jaar, gemiddeld = 45.1) vrouwen die aangaven momenteel op dieet te zijn, waarvan 23.6% overgewicht had. Voorafgaand aan de dagboekstudie werden de doelen en motieven voor eetregulatie in kaart gebracht. Gedurende één week hielden de deelnemers hun eetgedrag (gezonde eetgewoontes, controleverlies en piekeren over eten en gewicht) en dieet-specifieke ervaringen van behoeftefrustratie op dagelijkse basis bij.

Uit de resultaten bleken jongere zelfverklaarde diëters en diëters met overgewicht een dysfunctioneler motivationeel profiel te vertonen in vergelijking met volwassen diëters en diëters met een normaal gewicht. Meer bepaald waren laat-adolescente, in vergelijking met volwassen, diëters meer op aantrekkelijkheid gefocust en rapporteerden ze meer gecontroleerde

motieven, terwijl ze minder op gezondheid waren gericht en minder autonome motieven rapporteerden. Bovendien ervaarden ze meer dieet-specifieke behoeftefrustratie in vergelijking met de volwassen diëters. Diëters met overgewicht vertoonden meer gecontroleerde eetregulatie en reguleerden tegelijk hun eetpatroon op een minder autonome wijze en waren minder op gezondheid gericht in vergelijking met diëters met een normaal gewicht. Bovendien bleken diëters met overgewicht, in vergelijking met diëters met een normaal gewicht, meer dieet-specifieke behoeftefrustratie, meer piekeren rond eten en gewicht en meer controleverlies over eten te ervaren in vergelijking met diëters met een normaal gewicht. Ten tweede bleken op aantrekkelijkheid gerichte en gecontroleerde eetregulatie samen te hangen met meer piekeren over eten en gewicht en meer controleverlies over eten doorheen de week. Daartegenover werd gevonden dat op gezondheid gerichte en autonome eetregulatie samenhingen met meer gezonde eetgewoontes terwijl ze geen of een negatief verband vertoonden met symptomen van verstoord eetgedrag. Ten derde werd gevonden dat dieet-specifieke behoeftefrustratie een partieel mediërende rol speelde in de verbanden tussen de doelen en motieven en de uitkomsten. Ten slotte werd gevonden dat de verbanden tussen de doelen en motieven voor eetregulatie en de uitkomsten vergelijkbaar waren in laat-adolescente en volwassen diëters en in diëters met en zonder overgewicht.

Samenvattend geven deze bevindingen aan dat jongere diëters en diëters met overgewicht meer risico hebben om een dysfunctioneel motivationeel profiel te vertonen. De doelen en motieven blijken onafhankelijk van elkaar een bijdrage te hebben in de voorspelling van zowel gezonde eetgewoontes als symptomen van verstoord eetgedrag (piekeren over eten en gewicht en controleverlies over eten), waarbij dieet-specifieke behoeftefrustratie deels een verklarende rol speelt. De verbanden tussen de doelen en motieven en de uitkomsten blijken gelijkaardig bij adolescente versus volwassen diëters en bij diëters met versus zonder overgewicht.

Hoofdstuk 6 – Dagelijkse Schommelingen in Controleverlies bij Vrouwen: De Rol van Psychologische Basisbehoeften, Algemene Zelf-Controle en een Emotionele Eetstijl

In Hoofdstuk 6 werd dieper ingegaan op het verband tussen bevrediging en frustratie van de psychologische basisbehoeften in het algemene leven en controleverlies over eten, eerder dan behoeftebevrediging en frustratie specifiek met betrekking tot eetregulatie te meten. In een dagboekstudie werd nagegaan of schommelingen in psychologische behoeftefrustratie hand in hand gingen met schommelingen in controleverlies over eten. Hierbij werd de unieke voorspellende waarde van de drie afzonderlijke basisbehoeften getoetst. Daarnaast werd nagegaan of een emotionele eetstijl en algemene zelfcontrole samenhingen met de mate van ervaren controleverlies en het verband tussen psychologische behoeftefrustratie en controleverlies over eten afzwakte dan wel versterkte.

Om deze vragen te beantwoorden, werden 302 adolescente vrouwen (14 tot 23 jaar oud, gemiddeld 17.7) uitgenodigd om gedurende twee opeenvolgende weken dagelijks een dagboek in te vullen waarin gepeild werd naar behoeftebevredigende en -frustrerende ervaringen, alsook naar ervaringen van controleverlies over eten. Voorafgaand werd gemeten in welke mate de deelnemers een emotionele eetstijl en algemene zelfcontrole vertoonden.

Uit de resultaten bleken dagelijkse schommelingen in behoeftefrustratie samen te hangen met dagelijkse schommelingen in controleverlies over eten, waarbij de drie basisbehoeften een unieke voorspellende waarde hadden. Behoeftebevrediging bleek niet samen te hangen met controleverlies op dagdagelijkse basis. Zowel vrouwen die een emotionele eetstijl vertoonden als vrouwen die lager scoorden op algemene zelf-controle bleken meer controleverlies over eten te ervaren gedurende de twee opgevolgde weken. Bovendien bleek het verband tussen ervaringen van behoeftefrustratie en controleverlies over eten sterker te zijn bij vrouwen met een emotionele eetstijl.

Samenvattend geven deze bevindingen aan dat algemene behoeftefrustratie in het dagelijkse leven een rol kan spelen in het ervaren van controleverlies over eten, in het bijzonder bij vrouwen met een emotionele eetstijl. Mogelijks kan controleverlies als een compensatoir gedrag beschouwd worden om om te gaan met behoeftefrustrerende ervaringen in het dagelijkse leven.

Hoofdstuk 7 – Het Schoonheidsideaal en Eetregulatiedoelen: Een Onderzoek naar de Rol van Identiteitsstijlen

Een belangrijke ontwikkelingstaak in de adolescentie is het opbouwen van een coherente en persoonlijk doorleefde identiteit, waarbij een adolescent op zoek gaat naar wie hij of zij is en welke waarden en doelen onderschreven worden. De stijl waarop adolescenten hun identiteit opbouwen kan ook predictief zijn voor het type doelen die ze onderschrijven (e.g., Berzonsky, Cieciuch, Duriez, & Soenens, 2011; Duriez, Luyckx, Soenens, & Berzonsky, 2012). In Berzonsky's identiteitsmodel, wordt een onderscheid gemaakt tussen een informatie-georiënteerde stijl, een normatieve stijl en een vermijdende stijl. In Hoofdstuk 7 wordt de relatie tussen deze identiteitsstijlen in veranderingen in het persoonlijk onderschrijven van het schoonheidsideaal en op aantrekkelijkheid en gezondheid gerichte eetregulatie onderzocht.

Deelnemers aan de studie waren adolescenten tussen 12 en 17 jaar. Op Tijdstip 1 namen 418 adolescenten deel aan de studie (47.5% mannelijk). Op Tijdstip 2 en 3 namen respectievelijk 263 en 259 jongeren opnieuw deel. Uit de analyses bleken er geen verschillen te zijn tussen de jongeren die wel opnieuw deelnamen en de jongeren die niet opnieuw deelnamen aan de studie op Tijstip 1. Een tweede en derde afname werd uitgevoerd ongeveer 1 en 2 jaar na de eerste afname.

Uit de resultaten bleek een normatieve identiteitsstijl een stijging in persoonlijke overname van het schoonheidsideaal (i.e., slankheidsideaal voor meisjes, gespierd ideaal voor jongens) te voorspellen, terwijl een informatie-

georiënteerde identiteitsstijl een afname in het persoonlijk overnemen van het schoonheidsideaal voorspelde. De persoonlijke overname van het schoonheidsideaal voorspelde een stijging in op aantrekkelijkheid gerichte eetregulatie, maar niet in op gezondheid gerichte eetregulatie. Een vermijdende identiteitsstijl bleek niet samen te hangen met veranderingen in het overnemen van het schoonheidsideaal, maar voorspelde wel rechtstreekse dalingen in op gezondheid gerichte eetregulatie.

Deze bevindingen geven aan dat de wijze waarop adolescenten verschillende identiteitsopties exploreren en afwegen verband houdt met het type doelen en waarden dat ze uit hun omgeving overnemen. In het bijzonder jongeren met een normatieve identiteisstijl blijken meer risico te lopen om een dysfunctioneel motivationeel profiel voor eetregulatie te ontwikkelen, terwijl een informatie-georiënteerde identiteitsstijl jongeren beschermd tegen het overnemen van het schoonheidsideaal.

Hoofdstuk 8 - Discussie

Terugkoppeling van de Resultaten naar de Vijf Vooropgestelde Doelen

Een eerste doelstelling was het ontwikkelen van een *overkoepelend* motivationeel model. In Hoofdstuk 2 werd het proces van psychologische basisbehoeften geïntroduceerd als een principe dat zowel de positieve als de negatieve kant van eetregulatie kan verduidelijken, waardoor de psychologische basisbehoeften de literatuur omtrent verstoord eetgedrag en gezonde eetregulatie kan verenigen. Hoewel het gevoerde onderzoek binnen dit doctoraat een eerste stap vormde in het toetsen van een aantal hypotheses van dit model, is verder onderzoek nodig om verschillende onderdelen van het model te toetsen. Een tweede doelstelling was om na te gaan hoe het *"Wat"* en *"Waarom"* van motivatie zich verhouden ten opzichte van een diverse reeks uitkomsten, namelijk symptomen van verstoord eetgedrag (controleverlies en piekeren over eten en gewicht), gezonde eetgewoontes, uitputting en gewichtsverlies. Doorheen de verschillende hoofdstukken van het doctoraat werd evidentie gevonden dat een op aantrekkelijkheid gerichte

eetregulatie en gecontroleerde eetregulatie samenhing met meer dysfunctionele uitkomsten, terwijl een op gezondheid gerichte en gecontroleerde eetregulatie samenhing met meer adaptieve uitkomsten. Hierbij bleken de doelen en motieven ook onafhankelijk van elkaar uitkomsten te voorspellen. Een derde doelstelling was om het proces van psychologische *behoeftebevrediging* en *-frustratie* verder te exploreren in de context van eetregulatie. Algemene en dieet-specifieke behoeftefrustratie bleek samen te hangen met controleverlies over eten, piekeren over eten en gewicht en gevoelens van uitputting, terwijl dieet-specifieke behoeftebevrediging samenhing met gezonde eetgewoontes, gewichtsverlies en dalingen in uitputting. In Hoofdstuk 3 en 5 werd evidentie teruggevonden voor de mediërende rol van dieet-specifieke behoeftefrustratie, hetgeen niet gerepliceerd werd in Hoofdstuk 4. Dieet-specifieke behoeftesatisfactie werd enkel gemeten in Hoofdstuk 4, waar het een gedeeltelijk mediërende rol bleek te spelen. Een vierde doelstelling was om het motivationeel profiel van diëters te exploreren, daarmee rekening houdend met de *leeftijd* en de *gewichtsstatus*. Diëters met overgewicht en jongere diëters bleken een dysfunctioneler motivationel profiel te vertonen in vergelijking met diëters zonder overgewicht en volwassen diëters. De verbanden tussen de doelen en motieven en de diverse uitkomsten was wel vergelijkbaar bij adolescente en volwassen diëters en bij diëters met en zonder overgewicht.

Bredere Theoretische Reflecties

In de discussie werd op basis van de bevindingen verder gereflecteerd over de vragen of (1) eetregulatie adaptief is of beter vermeden wordt, (2) de doelen die men beoogde na te streven via eetregulatie (het "Wat") verder onderzocht dienen te worden naast de motieven voor eetregulatie (het "Waarom"), (3) het verschil tussen psychologische behoeftebevrediging en frustratie zinvol is en (4) het vooropgestelde motivationele model generaliseerbaar is.

Op basis van de resultaten van dit doctoraat werd besloten dat eetregulatie op zichzelf niet *adaptief of risicovol* is, maar de motivationele basis van eetregulatie aandacht verdient. In het bijzonder bleken op aantrekkelijkheid gerichte en gecontroleerde eetregulatie nadelige gevolgen met zich mee te brengen, terwijl op gezondheid gerichte en autonome eetregulatie net voordelen met zich meebrachten. Aangezien diëters met overgewicht en obesitas in het bijzonder kwetsbaar bleken voor een dysfunctioneel motivationeel profiel werd in de discussie van het doctoraat gepleit voor het explicieter opnemen van een motivationeel perspectief in traditionele behandelingen voor overgewicht en obesitas. Diverse suggesties voor toekomstig onderzoek werden tevens geboden.

Ten tweede werd in de discussie uitgewijd over de implicaties van de bevindingen van het doctoraat voor de ontwikkeling van de ZDT. De bevinding dat de twee autonome motieven, i.e., intrinsieke en geïdentificeerde motivatie, adaptieve gevolgen met zich meebrachten, terwijl de twee gecontroleerde motieven, i.e., geïntrojecteerde en externe regulatie, negatieve gevolgen met zich meebrachten, bevestigden de zinvolheid om onderscheid te maken tussen autonome en gecontroleerde motieven. Bovendien werd gevonden dat de doelen en motieven voor eetregulatie los van elkaar een impact hadden op diverse uitkomsten van eetregulatie. Deze bevinding gaf aan dat zowel het "*Wat*" als het "*Waarom*" in motivationeel onderzoek aandacht verdient, waarbij diverse suggesties voor toekomstig onderzoek geboden werden.

Een recente trend binnen de ZDT is om een onderscheid te maken tussen *behoeftebevrediging en frustratie*, waarbij bevrediging vooral voorspellend zou zijn voor welzijn en positieve uitkomsten, terwijl behoeftefrustratie voorspellend zou zijn voor malfunctioneren en zelfs pathologische uitkomsten. De resultaten van het huidige doctoraat bevestigden deze trend aangezien behoeftebevrediging vooral voorspellend bleek voor symptomen van verstoord eetgedrag, terwijl enkel

behoeftebevrediging voorspellend was voor gewichtsverlies en gezonde eetgewoontes.

Ten slotte werd uitgewijd over de generaliseerbaarheid van motivationele dynamieken over verschillende leeftijds- en gewichtsgroepen heen. Hoewel leeftijd en gewicht een relatie vertoonden met het motivationeel profiel van diëters, bleek immers dat gecontroleerde motieven en op aantrekkelijkheid gerichte eetregulatie negatieve gevolgen had voor iedereen, terwijl autonome motieven en op gezondheid,gerichte eetregulatie positieve gevolgen had voor iedereen. Deze bevindingen waarschuwen voor de negatieve gevolgen van het onder druk zetten van patiënten om gewicht te verliezen en pleiten voor het verhogen van autonome en op gezondheid gerichte eetregulatie. In toekomstig onderzoek is het belangrijk om na te gaan of de bevindingen uit het onderzoek kunnen gegeneraliseerd worden naar mannelijke diëters.

Beperkingen

Methodologische beperkingen van het huidige doctoraat werden verder besproken. Hierbij werd in het bijzonder stil gestaan bij: (1) het gebruik van correlationele methodes, waardoor oorzaak en gevolg relaties niet kunnen bepaald worden; (2) het exclusieve gebruik van zelf-rapportage vragenlijsten waardoor gemeenschappelijke methode variantie de geobserveerde relaties artificieel kan opdrijven. Er werden suggesties geboden voor methodologisch vernieuwende studies in toekomstig onderzoek.

Klinische Implicaties

Ten slotte werden klinische implicaties van het huidige doctoraat besproken. In een eerste deel werd de nadruk gelegd op het explicieter opnemen van een motivationeel perspectief op gedragsverandering, waarbij rekening wordt gehouden met het motivationeel profiel van cliënten en met de psychologische basisbehoeften. Hierbij werd de literatuur omtrent

Motivationeel Interviewen (MI; Miller & Rollnick, 2002) verder besproken in relatie tot eetregulatie, waarbij ook stil gestaan werd bij gelijkenissen en verschillen tussen MI en ZDT. Verder werd een beknopt overzicht geboden van de therapeutische technieken die een autonome motivatie dan wel een gecontroleerde motivatie kunnen verhogen. Zo werd in het bijzonder aandacht geschonken aan de rol van financiële beloningen, die vanuit de ZDT fungeren als een dubbelsnijdend zwaard, aangezien ze aanvankelijk wel gedragsverandering kunnen aanmoedigen, maar op langere termijn mogelijks een ondermijnend effect hebben op blijvende gedragsverandering.

In een tweede deel werden een aantal suggesties gegeven voor preventieve zorg, waarbij werd stil gestaan bij de rol van het opbouwen van algemene weerbaarheid tegen blootstelling aan het schoonheidsideaal via het verhogen van de algemene autonome oriëntatie en mindfulness. Bovendien werd gesuggereerd dat het opbouwen van een "intern kompas" van waarden en doelen waar men zich ten volle kan achter scharen als een buffer kan fungeren tegen het ontwikkelen van verstoord eetgedrag.

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